NATIONAL SENIOR CERTIFICATE EXAMINATION
NOVEMBER 2015

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 1.1.1 The sailing vessel shall keep out of the way of the vessel engaged in fishing. She should alter course to starboard to pass well clear ahead of the fishing vessel, or alternatively stop and navigate with caution to allow the fishing vessel to pass ahead. Her intentions should be clear with a bold alteration in course or speed and made in good time to avoid a close quarter situation. (5)

1.1.2 The fishing vessel must keep well clear of the NUC vessel passing either to port or starboard of her, whichever is the safest. (5)

1.1.3 Vessel 'A' should maintain her course and speed. She should continue monitoring vessel 'B', and if 'B' does not take any action to avoid a close quarter situation, vessel 'A' may take action to avoid collision by her manoeuvre alone. She shall sound 5 short blasts to alert vessel B to take action. (5)

1.2 A vessel that hears apparently forward of her beam the fog signal of another vessel shall reduce her speed to the minimum at which she can maintain steerage or maintain her course. She shall, if necessary, stop or take all way off the vessel, and in any event navigate with extreme caution until the danger of collision is over (Rule 19 e). (15)

[30]

QUESTION 2

2.1
- Prepare all lifeboats and rafts for launching
- Muster the ship's complement wearing life-jackets
- Transmit the distress message (Mayday)
- 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 (GMDSS), charts and navigational equipment. (6)

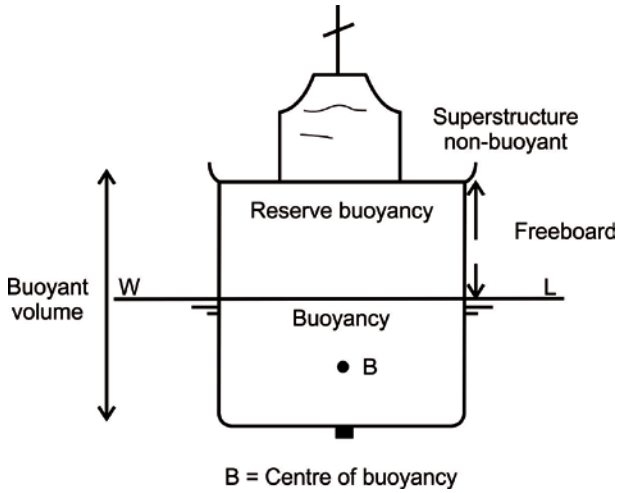
2.2
- Boats should clear away from the ship's side as quickly as possible and remain at a safe distance close to the ship.
- Motor boat or rescue boat to gather all boats and rafts together and secured by their painters.
- Recover any survivors from the water.
- Once all personnel, boats and rafts have been accounted for, assess the situation and attend to injuries.
- Ensure all boats and rafts remain together and connected.
- Set up the SART. (4)

[10]

QUESTION 3

3.1 Archimedes' Law states that when an object or vessel is wholly or partially immersed in liquid, it experiences an upthrust or loss of mass (buoyancy force), equal to the mass of liquid displaced. (4)

3.2



(8)

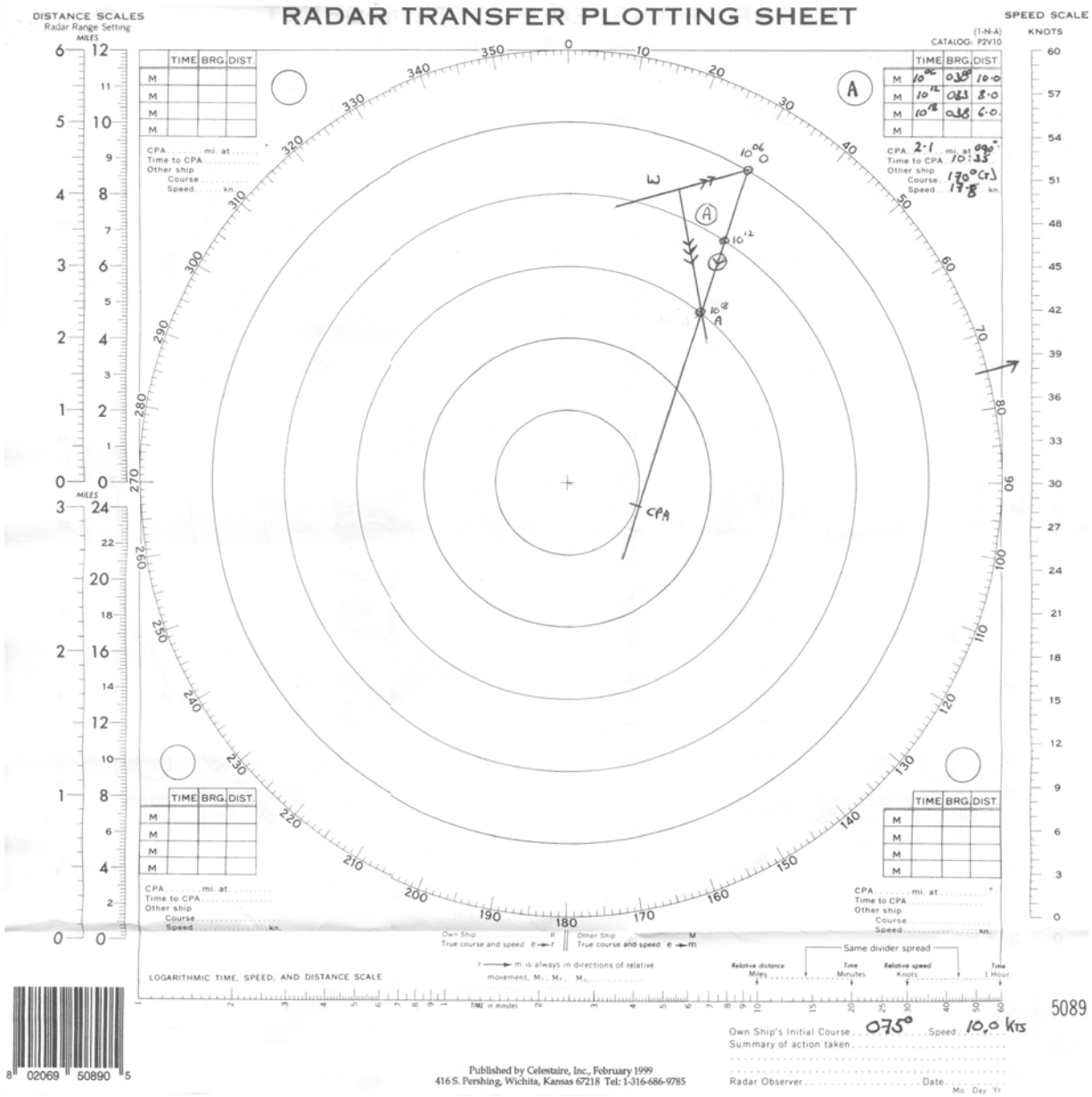
3.3
- Reduce or increase the stability of the vessel.
- Cause the vessel to list to port or starboard.
- Change the trim of the vessel.
- Affect the longitudinal bending moment of stress.
- Affect the transverse torsional moment of stress.

(Any 4 of the above.) (8)

[20]

QUESTION 4

4.1 See plotting sheet below.



(5)

4.2	Target identification	'A'
	Time of initial plot	10:06
	Initial range and bearing	030° (T) × 10 miles
	CPA	2,1 miles bearing 109° (T)
	Time of CPA	10:35
	Target's true course	170°
	Target's true speed	17,5 knots. (10)

4.3 If 2 miles is considered a safe distance then maintain course and speed. (Speed considered excessive/unsafe in fog.)

If 2 miles is not considered a safe distance under the circumstances then reduce speed to maintain steerage until 'A' has passed ahead and clear.

In any case continue to monitor the vessel's course and speed till she has passed clear. (5)

[20]

QUESTION 5

5.1 A break-bulk vessel carries smaller packages of cargo (eg crates, boxes, bales, etc.) which are loaded and discharged piece by piece, it has multi-decks (tweendecks and lower hold), and is normally geared with derricks or cranes. There is greater amount of cargo handling than in a container ship where the cargo is unitised. Containers are pre-packed with cargo before loading onboard. (5)

5.2
- Multi-deck in each hatch
- Derricks and cranes for handling smaller lifts (5 – 20 ton SWL)
- Specialised compartments, multipurpose usage of deep tanks, reefer chambers and bullion rooms
- Project and heavy-lift cargoes carried
- Accommodate containers and forrest products as well
- Can carry bulk cargoes and utilise maximum volume of the hold (grain space)
- Capacity for deck cargoes.

(Any 5 answers from above list.) (5)

[10]

90 marks

SECTION B COMMUNICATIONS AND METEOROLOGY

QUESTION 6

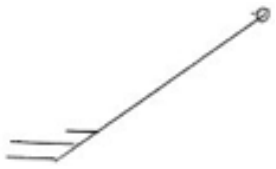
6.1 SART, or Search and Rescue Transponder, is a portable transponder which is designed to provide a locating signal. It is designed to be carried in a survival craft. When a 9 GHz Radar integrates the SART, it will provide a series of 12 dots on the Radar display showing the course to steer to intercept the SART or survival craft. (6)

6.2
- Transmission of ship-to-shore distress alerts by at least two separate and independent means.
- Reception of shore-to-ship distress alerts.
- Transmission and reception of ship-to-ship distress alerts.
- Transmission and reception of search and rescue coordinating communications.
- Transmission and reception of on-scene communications.
- Transmitting and reception of signals for locating (SART and EPIRB).
- Transmission and reception of Maritime Safety Information (MSI).
- Transmission and reception of general radio communications to or from shore-based radio system networks.
- Transmission and reception of bridge-to-bridge communications. (9)

[15]

QUESTION 7

7.1
- 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), Cumulus (Cu) clouds result.
- Stratus clouds – When two masses of air from different sources and having 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 which is classified as stratiform or stratus-type cloud. (16)

7.2 

(2)

7.3 An isobar is a line on a weather chart joining points of equal barometric pressure. (2)

[20]

35 marks

SECTION C SAILINGS

QUESTION 8

8.1

	LAT	Mid-LAT	LONG	
Own ship	31° 06' S	31° 06' S	013° 35' E	
Distress Position	26° 33' S	26° 33' S	006° 14' E	(3)
D.Lat/D.Long	4° 33' N	57° 39'	7° 21' W	(3)
Mid – Lat	273' N	28° 50'	441' W	(3)

Dep	=	D.Long × Cos Mid-Lat	
	=	441 × Cos 28° 50'	
Distance	=	386.328	(4)

Tan Co.	=	Dep/D. Lat	Dist	=	D. Lat/Cos. Course	
	=	386.328/273		=	273/Cos. 55°	
Course	=	N 55° W		=	476 miles	(4)
	=	305°				(4)

8.2 Steaming time at 25 knots = Dist/Speed
= 476/25
= 19h 02m (4)

25 marks

Total: 150 marks