



NATIONAL SENIOR CERTIFICATE EXAMINATION  
NOVEMBER 2020

## NAUTICAL SCIENCE: PAPER II

Time: 3 hours

150 marks

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### PLEASE READ THE FOLLOWING INSTRUCTIONS CAREFULLY

1. This question paper consists of 5 pages. Please check that your question paper is complete.
2. Answer **ALL** the questions in Sections A, B and C.
3. Begin the answer to each new question on a new page.
4. The use of scientific calculators is permitted.
5. Alphanumeric calculators and dictionaries are **NOT** permitted.
6. Nautical tables may be used.
7. It is in your own interest to write legibly and to present your work neatly.

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### REQUIREMENTS

Drawing instruments  
Radar plotting sheet

**ANNEXURES** – Nil

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**SECTION A SEAMANSHIP****QUESTION 1 RULE OF THE ROAD**

- 1.1 In terms of the International Regulations for Preventing Collision at Sea, 1972, as amended, when two sailing vessels are in sight of and are approaching each other in a manner which involves risk of collision, what is the responsibility of each vessel if ...
- 1.1.1 each vessel has the wind on a different side? (3)
- 1.1.2 each vessel has the wind on the same side? (3)
- 1.1.3 one of the vessels cannot determine with certainty whether the other vessel has the wind on the port or starboard side? (4)
- 1.2 What are the prescribed sound signals for any vessel at anchor in or near an area of restricted visibility? (5)
- 1.3 Draw the day shapes displayed by a vessel, at anchor and engaged in dredging or underwater operations, seen from ahead when an obstruction exists on her starboard side.
- Indicate the side on which another vessel may safely pass. (10)
- 1.4 Define the term "vessel engaged in fishing". (5)
- [30]**

**QUESTION 2 IALA BUOYAGE SYSTEM**

- 2.1 When proceeding along a buoyed channel, to which side must you keep? (1)
- 2.2 What colours are used for ...
- 2.2.1 lateral marks? (2)
- 2.2.2 safe water marks? (2)
- 2.2.3 special marks? (1)
- 2.3 What top marks do the following buoys have?
- 2.3.1 Lateral (2)
- 2.3.2 Special (1)
- 2.3.3 Isolated danger (2)

- 2.4 If you see a cardinal mark painted with the horizontal bands black-yellow-black, on which side do you pass it (i.e. north, south, east or west)? (1)
- 2.5 If you see a cardinal mark with two conical top marks, the apexes (tops) of which point upwards, on which side would you pass the buoy (i.e. north, south, east or west)? (1)
- 2.6 On which side do you pass a buoy which is painted with red and white vertical stripes? (1)
- 2.7 On which side would you pass a yellow spherical buoy? (1)
- [15]**

### **QUESTION 3 SEAMANSHIP**

What are the immediate actions to be taken by a person who first discovers a fire in the accommodation of the vessel?

List and briefly describe at least three of the most important actions in order of priority.

**[5]**

<b>50 marks</b>
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**SECTION B                      COMMUNICATIONS AND METEOROLOGY****QUESTION 4                      COMMUNICATIONS**

- 4.1     Your vessel's name is "Madiba," call sign ZSTW, and you are 50 miles NNE of Richard's Bay proceeding towards the port in heavy weather, strong gale force winds from the South, and you have reduced speed. You lose three containers washed off the main deck into the sea.

Give an example of the warning you would broadcast over radio of the navigation dangers of this cargo lost overboard. (13)

- 4.2     Your vessel is at anchor at the inner anchorage of Richard's Bay. Divers are inspecting your hull, and you have a cargo of explosives on board.

What two flags will you fly to indicate the above situation? (2)

- 4.3     Your vessel, "Madiba," call sign ZSTW, has broadcast a distress message because your vessel has broken down and is drifting close to the beach. Subsequently your engine is restarted and your situation no longer requires assistance. What is one of the first things you should do? Give an example of your message. (10)

**[25]**

**QUESTION 5                      METEOROLOGY**

- 5.1     Describe with the aid of a sketch what a "Col" is. In your sketch show the relevant pressures of each of the isobars and wind direction, assuming this is in the southern hemisphere. (15)

- 5.2     Explain, in respect of temperature, atmospheric pressure, dew point, wind and precipitation, what happens when a warm front approaches. (8)

- 5.3     What instruments on board a ship will indicate the approach of a tropical cyclone? (2)

**[25]**

<b>50 marks</b>
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**SECTION C SAILINGS****QUESTION 6**

- 6.1 What is the course and distance from Fremantle (W. Australia) in lat.  $32^{\circ} 03' S$ ; long.  $115^{\circ} 44' E$  to Durban in lat.  $29^{\circ} 52' S$ ; long.  $031^{\circ} 03' E$  using the Mercator Sailing Method.

LATITUDE	MERIDIONAL PARTS
$32^{\circ} 03' S$	2019,50
$29^{\circ} 52' S$	1867,49

(15)

- 6.2 What is the ETA in Durban (Zone-2) for a ship departing Fremantle on 28 December 2005 at 18:00 (Zone-8) if the ship is expected to average 15 knots?

(10)  
[25]**QUESTION 7**

- 7.1 A vessel is on passage from Durban to Port Elizabeth. On 1 March 2004 at 18:00 (SAST) the vessel's position was determined as  $33^{\circ} 15' S$   $28^{\circ} 00' E$ . Calculate the course and distance to reach Algoa Bay position  $34^{\circ} 00' S$   $26^{\circ} 00' E$ ;
- 7.2 Calculate the estimated date and time (SAST) of arrival of the vessel at the position in Algoa Bay if the vessel makes 12 knots over the ground.

(16)

(4)  
[20]**QUESTION 8**

Explain the reason why "plane sailing" is used in certain circumstances and "Mercator sailing" in different circumstances.

[5]

<b>50 marks</b>
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**Total: 150 marks**