NATIONAL SENIOR CERTIFICATE EXAMINATION
NOVEMBER 2008

NAUTICAL SCIENCE: PAPER II

Time: 3 hours Marks: 150

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 each answer 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.

REQUIREMENTS

Drawing instruments.
Radar plotting sheet.

SECTION A SEAMANSHIP

QUESTION 1

The following vessels are in clear weather and in close proximity to each other (so as to involve possible risk of collision):

- A tug and tow heading north;
- A power-driven vessel of length 150m heading south;
- A sailing vessel heading west and 4 points on the port bow of the vessel heading south.

1.1 What is the responsibility of each of the vessels so as to comply with the International Regulations for Preventing Collisions at Sea 1972 (as amended)? (10)

1.2 What should each of the vessels mentioned in the question above sound in fog (restricted visibility)? (6)

1.3 What sound signal shall each of the vessels mentioned in the question above sound in sight of one another (in clear visibility)? (6)

1.4 Draw the lights and shapes displayed by the tug and its tow (the overall length of the tug and tow is less than 200m) underway viewed from
(a) ahead;
(b) astern. (8)
[30]

QUESTION 2

List ten recognised signals used or exhibited to indicate your vessel is in distress and needs assistance. **[10]**

QUESTION 3

3.1 The hold of a ship is partly filled with bulk grain. During the loading the ship takes a list, and a quantity of grain shifts so that the surface of the grain remains parallel with the waterline.

Show the effect of this shift of grain on the ship's Centre of Gravity. Illustrate your answer with a cross section sketch of the ship clearly indicating the ship's keel and centre of gravity before and after the grain shift. (15)

3.2 A ship of 20 000mt displacement has a KG = 4,5m. A container weighing 20,0mt in the lower hold has a KG = 2,0m. The container is then raised clear of the tank top and suspended by the ship's crane. The head of the crane's boom is 14,0m above the keel.

What is the new KG of the ship? (10)
[25]

QUESTION 4

Your power driven vessel is on a course 000° (T) at a speed of 12 knots. The visibility is below 1 n. mile.

The radar observation of an approaching target shows the following:

TIME	BEARING	RANGE
08H06	355° (T)	5,0 M
08h12	356° (T)	4,2 M
08h18	357° (T)	3,6 M

4.1 Make a suitable plot showing the target's relative course and speed **on the plotting sheet provided**. (4)

4.2 Determine the target's true course and speed. (4)

4.3 Determine the time and distance of the target's nearest point of approach; (assuming NO alteration of course or speed). (4)

4.4 What alteration of course would you require to make at 08h30 in order for the target's nearest point approach to be minimum 2,0 M off your starboard side (assuming your vessel maintains speed of 12,0 knots and the target retains its present course and speed)? Demonstrate your answer on the plotting sheet. (6)
[18]

QUESTION 5

List two commodities that would be either imported or exported at the following harbours and explain briefly (in one sentence) why they are shipped through that port:

5.1 Richards Bay (3)

5.2 Durban (3)

5.3 Cape Town (3)

5.4 Saldanha Bay (3)
[12]

95 marks

SECTION B COMMUNICATIONS AND METEOROLOGY

QUESTION 6

6.1 Your vessel name is 'Madiba', call sign ZSTW, and you are 50 miles NNE of Richards 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. (5)

6.2 Your vessel is at anchor at the inner anchorage of Richards 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? (4)

6.3 Your vessel, 'Madiba', call sign ZSTW, has broadcast a distress message because your vessel has broken down and 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. (6)

[15]

QUESTION 7

7.1 List any four of the principal cloud forms and describe the general characteristics of each one. (16)

7.2 What can be found by comparing the 'wet' and 'dry' bulb readings of a ship's hygrometer?

Having found the difference between the dry and wet bulb readings onboard a ship, state one use that can be made of this information. (4)

[20]

35 marks

SECTION C SAILINGS

QUESTION 8

8.1 On a passage from New York to Cape Town your vessel's position is observed at Noon (GMT+1) on the 22nd October 2004 to be 29° 32'S 12° 58'E. Calculate the course and distance to reach the next alter course position off Cape Town in Latitude 33° 52'S and Longitude 18°18'E. (10)

8.2 You are required to rendezvous with the Cape Town Pilot at 08h00 (SAST) on 23rd October. If the Pilot position is a further 6,0 miles East from the alter course position in 8.1 above, what is the required speed in order to make that rendezvous? (5)

[15]

QUESTION 9

Why is it necessary to use Mean Latitude when finding the Departure between two places using Plane Sailing? (5)

[5]

20 marks

Total: 150 marks