



NATIONAL SENIOR CERTIFICATE EXAMINATION
NOVEMBER 2013

MARITIME ECONOMICS

Time: 3 hours

300 marks

PLEASE READ THE FOLLOWING INSTRUCTIONS CAREFULLY

1. This question paper consists of 10 pages. Please check that your question paper is complete.
 2. Answer all the questions.
 3. Read the questions carefully before answering.
 4. It is in your own interest to write legibly and to present your work neatly.
 5. Where calculations are involved, all working must be shown.
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QUESTION 1 THE MARITIME WORLD

- 1.1 Coal-fired steam engines were used extensively in ships until motorships came into service. Give two advantages of ships being powered by engines using heavy oil fuel rather than coal. (4)
- 1.2 Read the extract below. It has been adapted from *A Sailor's Scrapbook*, the edited diary of Gordon Belton who sailed in a four-masted sailing ship in the 1940s. The sailing ship had no engine and relied entirely on the wind for propulsion.

Still becalmed, sunny with rain squalls. Eventually a breeze sprang up and changed to the north-east ... We were heading south by east to get further south into the strong westerly winds ... Suddenly, a squall hit us and we leaned over at a dangerous angle and rushed along at 12 knots! [That was considered fast for a sailing ship.] The combined strength of four men could only just turn the ship's wheel ... suddenly there was a loud crash that we heard above the howling of the wind ... a sail had been blown apart by the wind and I saw a huge sheet of canvas go hurtling into the sea! After the scare had passed, I began to enjoy myself, soaking wet from both the rain and spray, and working with all the enthusiasm of a 'first tripper' ... I watched the ship charging through the angry seas with her topsails filled with wind. Great waves came aboard, foaming along our sloping deck ... After making the sails fast, we were kept busy until midnight, coiling ropes on deck. Later, our heads hit our pillows, and we were tired out from our exertions during a most memorable watch ...

- 1.2.1 Quote an extract from the passage above that shows that Gordon Belton enjoyed his time at sea. (2)
- 1.2.2 Quote an extract from the passage above that describes aspects of life aboard a sailing ship that were frightening. (2)
- 1.2.3 Basing your answer on the passage above, give three ways in which the design and operation of modern ships make life easier for crew members at sea. (6)
- 1.2.4 After an almost complete switch to heavy fuel oil or other forms of liquid fuels, some ship-owners are exploring ways to use the wind to power their ships. Why are they doing this? (6)
- 1.3 Study the table provided below, showing the distribution and number of idle containerships early in 2013. Now answer the questions below.

Region	Number of idle containerships
Australasia	00
Central America	09
East, West and Southern Africa	00
Europe and Mediterranean	43
Middle East and Indian Subcontinent	18
North America	05
North-East Asia	132
South America	11
South-East Asia	85

- 1.3.1 Where are most containerships idle? (2)
- 1.3.2 What is the total of idle containerships? (4)
- 1.3.3 Of these idle ships, many are smaller vessels that are no longer economical to operate, especially between ports that are close together.
- (a) Give two reasons for some shorter containership services being uneconomical to operate. (4)
- (b) Name two South African ports (apart from Durban and Cape Town) that once were served by regular coastal shipping services but now have no dedicated coastal shipping services. (4)
- 1.3.4 Look at the figures for East, West and Southern Africa and Australasia.
- (a) What is remarkable about these figures? (2)
- (b) Give two possible explanations for these figures. (4)
- 1.4 Read the edited extract from *Marine Shipping Morning Report* provided below and answer the questions set.

Oil Tankers:

VLCC rates are up with Arabian Gulf-Far East rate up to about \$11 600/day from about \$10 300/day. West Africa-US Gulf are up from about \$13 400/day to about \$14 500/day. Asia-bound product tanker rates are also improving with tankers on long-range voyages securing about \$21 000/day, improving from about \$20 300/day.

LNG Carriers:

Spot rates are steady at about \$115 000/day but spot LNG prices are under pressure because of limited demand for spot cargoes as the northern hemisphere winter season comes to an end.

- 1.4.1 Name one country that is located in the Arabian Gulf and one in the Far East. (4)
- 1.4.2 If you owned a VLCC and noted the figures provided above, would you prefer to trade from the Arabian Gulf to the Far East or from West Africa to the US Gulf? (2)
- 1.4.3 Give a reason for your answer to Question 1.4.2. (2)
- 1.4.4 Give two cargoes that a product tanker would carry. (4)
- 1.4.5 What is LNG? (2)
- 1.4.6 Explain the reason for there being 'limited demand for spot LNG cargoes as the northern hemisphere winter season comes to an end'. (6)

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QUESTION 2 SHIPPING OPERATIONS

Here are some details about the containership *Viking Star*.

<i>Owners</i>	Viking Shipping, Oslo, Norway	
<i>Managers</i>	Nordpool Ship Managers, Rotterdam, Netherlands	
<i>Port of Registry</i>	Oslo, Norway	
<i>Classification Society</i>	Det Norske Veritas	
<i>Year built</i>	2010	
<i>Insurance</i>	Hull & Machinery: Lloyds Covered by Southern P & I Club	
<i>Dimensions of the ship</i>	Length overall	302 metres
	Beam	46 metres
	Draught (fully laden)	13 metres
<i>Cargo Capacity</i>	9 800 teu (including 1 800 40-foot reefer slots)	
<i>Daily Operating Costs</i>	\$12 000 (excluding fuel)	
<i>Usual Schedule</i>	Rotterdam (Netherlands)-Suez-Singapore-Hong Kong- Shanghai (China)-Yokohama (Japan)-Singapore- Felixstowe (UK)-Rotterdam	

- 2.1 Has this ship been flagged out? Answer YES or NO. (2)
- 2.2 Give a reason for your answer to Question 2.1. (2)
- 2.3 This ship is classed by Det Norske Veritas. Describe the role of Det Norske Veritas for this ship. (10)
- 2.4 When *Viking Star* arrived in Singapore, a surveyor boarded to do a Port State Control inspection in terms of Safety of Life at Sea. List three aspects of the ship that he might want to inspect. (6)
- 2.5 Which country would undertake a Flag State inspection of the ship? (2)
- 2.6 Give two functions of the Flag State in respect of this ship. (4)
- 2.7 When *Viking Star* arrived in Rotterdam from Felixstowe, she was carrying the following cargo:

40' containers	2 044
20' containers	278
40' reefer containers	459
NB: 40' R = 40' Reefer Container	

Assume this ship is scheduled to discharge and load the following containers:

	Discharge	Load
Rotterdam	2 504 (40')	3 032 (40')
	62 (20')	103 (20')
	108 (40' R)	97 (40' R)
Singapore	1 014 (40')	1 792 (40')
	56 (20')	76 (20')
	36 (40' R)	26 (40' R)
Hong Kong	1 354 (40')	904 (40')
	41 (20')	145 (20')
	76 (40' R)	92 (40' R)

Now answer the questions set.

- 2.7.1 How many reefer container slots were NOT in use when *Viking Star* sailed from Rotterdam? (8)
- 2.7.2 One of the company's feeder ships has broken down in Hong Kong and has the following cargo aboard destined for Shanghai:
- | | |
|-----|-----|
| 40' | 362 |
| 20' | 32 |
- (a) What is a feeder ship? (4)
- (b) Can *Viking Star* accommodate all the containers that were aboard the feeder ship and destined for Shanghai? **NB: You must show your working when you calculate your answer. If you only give YES or NO as your answer, the maximum number of marks you will receive is 2.** (10)
- 2.7.3 In Singapore, four gantry cranes will be available for *Viking Star* when she works cargo. Each gantry can handle 25 containers per hour, breaks and shift changes will total 3 hours. She will sail two hours after she has finished cargowork.
- (a) How many hours will it take to handle all the containers in Singapore, including breaks? (6)
- (b) If she starts cargowork at 10:00 on 29 November, what is her expected time of departure from Singapore? (6)
- 2.7.4 Where would containers carrying Dangerous Goods be stowed on the ship? **CHOOSE FROM: NEAR THE ACCOMMODATION or NEAR THE BOW or MIDSHIPS or IN NO 1 HOLD or IN NO 10 HOLD.** (2)
- 2.7.5 Explain the difference if cargo in one container is shipped FOB (free on board) and cargo in another container is shipped CIF (cost of insurance and freight). (6)

2.8 As *Viking Star* approaches Felixstowe at 06:00, a very heavy swell is running when the pilot launch comes alongside for the pilot to board. Unfortunately, a rung on the pilot ladder breaks as the pilot steps onto it, and as the launch is pitching in the heavy swell, the pilot falls awkwardly back onto the launch and is seriously injured. The launch immediately turns and heads back to the harbour to land the injured pilot, and the ship is instructed by Felixstowe port control to go to the anchorage to await further instructions. She drops anchor at 06:40.

The master inspects the broken rung of the ladder and believes that it may have been damaged by the launch as she came alongside the containership in the heavy swell.

At 08:00, port state control officials and the Felixstowe port captain board the ship and question the master, the chief officer and the bosun about the safety of the pilot ladder which they also inspect.

The ship is allowed to enter harbour at 13:00 and cargowork begins at 14:00, about six hours later than would have been the case had the accident not happened.

2.8.1 Assume that the inquiry found that the ship was at fault regarding the collapse of the rung of the pilot ladder. What type of marine insurance covers the injury to the pilot? (2)

2.8.2 Assume that the inquiry ruled that the pilot launch had damaged the rung of the pilot ladder. How would this affect the subsequent insurance claims surrounding the injury to the pilot? (6)

2.8.3 You are the Master of *Viking Star*. You were on the wing of the bridge when the pilot launch came alongside and you witnessed the incident in which the pilot was injured.

(a) Write a report, giving times and details of the accident, and describe the action you took immediately when it happened, and the subsequent communication you had with Felixstowe port control. (10)

(b) To whom would copies of the report be sent? (8)

2.9 The Netherlands is famous for its chocolate production.

2.9.1 Describe the procedures involved in moving a refrigerated container (also known as a reefer container and containing dozens of boxes of slabs of Hollandsche Sjokolade) from the chocolate factory in Leiden (about 30 km by road from Rotterdam) to the warehouse of Sing's Supermarket, 10 kilometres from Singapore. The ocean leg of the shipment is provided by *Viking Star*. Remember to refer to the various checks that are made along the way, the bill of lading, and other documentation required. (10)

2.9.2 For the shipment described in Question 2.9.1, who is ...

(a) the consignor?

(b) the carrier? (4)

- 2.10 A Panamanian ship goes ashore and some of her bunker fuel leaks from a tank. The following appeared in the local newspaper:

Ship aground near beaches

The 26 700-ton bulk carrier *Gannet* went aground last night on Sunset Beach, 40 kilometres from the harbour. A crack appeared on her starboard side soon after she came ashore, and fuel oil began to leak from the ruptured tank, endangering the penguin colony nearby.

Pete Smith, a spokesman for Seabirds Conservation Society, said that if the oil reached the penguin colony, it would have disastrous effects on the bird population because it was the breeding season and dozens of chicks had already hatched. "If the parent birds go into the sea to feed," he said, "they will have to cross an oil barrier that already extends several metres up the beach." Clearly angered by the incident, Smith added, "It's these flag of convenience ships that cause all the trouble!" he fumed.

A port spokeswoman said that the ship had experienced engine trouble and, because of a very strong wind and heavy swell, the vessel had drifted ashore before tugs could reach her.

The weather service forecasts stronger wind and heavier seas tonight, causing Captain Joe Mitchell, the salvage master assigned to the casualty, to fear that the ship may break up completely during the night.

Mr Antonio Georgios, a representative of the owners, Georgios Shipping of Greece, would not comment on the accident, saying only that the company was investigating the causes of the ship going ashore and that a statement would be issued later today.

- 2.10.1 Why do maritime casualties – like that of *Gannet* – attract such public interest? (4)
- 2.10.2 Why do the media and some members of the public focus on the fact that this is a 'flag of convenience' ship? (4)
- 2.10.3 Which extremely important matter is not referred to by any of the people mentioned in the article? (2)
- 2.10.4 Was the wind blowing onshore or offshore? (2)

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QUESTION 3 INTERNATIONAL TRADE

- 3.1 State subsidies for a shipbuilding industry mean that shipbuilding yards in that country (Country A) can build ships at a lower cost than shipyards in another country (Country B) that does not subsidise shipbuilding.
- 3.1.1 If the quality of shipbuilding in Country A and Country B is similar, which country's shipyards would a ship-owner choose to build his ships? (2)
- 3.1.2 Give a reason for your answer to Question 3.1.1. (2)
- 3.2 Look at the service on which the containership *Viking Star* trades (See Question 2). Name two zones of convergence (besides the Bab-el-Mandeb to Suez route) through which the ship will pass during her usual voyages between the Far East and Europe. (4)
- 3.3 The International Ship and Port Security Code (ISPS) was introduced after a major incident.
- 3.3.1 Which organisation introduced this code? (2)
- 3.3.2 Refer to your answer to Question 3.3.1. Of which international organisation is that an agency? (2)
- 3.3.3 What was the incident that caused this code to be introduced? (2)
- 3.4 *Viking Star* leaves Singapore for Port Suez at the southern end of the Suez Canal. She will take 1 day to pass through the Suez Canal and will take 8 days to steam from Port Said at the northern end of Suez Canal to Felixstowe. Her usual fuel consumption is 64 tons of HVF per day at sea, and the price of HVF in Singapore where she bunkered is \$790 per ton. Her consumption of MDO is 3 tons (\$1 096 per ton) per day at sea and in port.

However, on the ship's arrival at the southern end of the canal at 00:01 on 14 February, riots in Port Suez prevent Suez Canal pilots and tug crews from getting to work and the ship cannot enter the canal, but has to anchor for two full days until the riots stopped. She finally enters the canal at 14:00 on 16 February and clears the canal at midnight that night. To ensure that she arrives in Felixstowe on time, she will have to increase speed and she will now take 6 days to steam from Port Said to Felixstowe. While her MDO consumption will be unaffected, she will use 92 tons of HVF per day.

- 3.4.1 How much **more expensive** will it be with her having to anchor for two days during the strike and having to increase speed for the Port Said-Felixstowe leg of the voyage?

NB: Do not forget to include her daily operating costs in your calculation. Note the location of Port Suez and Port Said.

Assume fuel consumption during her time at anchor and when she passed through the canal to be the same as being 'at sea'. (10)

3.4.2 Write the text of the email that you, as the Master of *Viking Star*, would send to the Marine Director of Viking Shipping, Oslo, in which you explain **in point form** the reasons for the delay, your observations of what is happening ashore in Port Suez (and what you may have heard from various sources, such as local English radio broadcasts, or your ship's agent at Port Suez) and how you plan to maintain your schedule to arrive on time in Felixstowe. (12)

3.4.3 Now write another email to the Marine Director in which you confirm that your ship has cleared the canal, is now on passage to Felixstowe, and give your ETA at Felixstowe. *NB: Show the calculations of your ETA at Felixstowe.* (10)

3.5 Reports indicate that the harbour facilities and other maritime-related functions of Port X are likely to be expanded over the next 30 years and that estimates of changes in its yearly cargo through-put are shown below:

Cargo	Tonnage 2012	Expected tonnage 2042
Iron Ore (Exports)	45 million	85 million
Manganese (Exports)	05 million	08 million
Crude oil (Imports)	12 million	24 million

3.5.1 It is estimated that ships with a cargo capacity of 200 000 tons will be used to move the additional iron ore exports. How many more ships will call to handle the increased iron ore exports? (6)

3.5.2 By what percentage will the manganese exports increase? (6)

3.5.3 The current oil terminal at Port X can handle one tanker of 300 000-ton cargo capacity *a week*. Forty tankers are calling a year at present, and 80 tankers will call each year from 2042.

(a) Will an extra tanker berth be required to handle the extra tankers? Answer YES or NO. (2)

(b) Explain your answer to Question 3.5.3(a). (6)

(c) Besides any extra tanker berths that *may* be required, what other expansion will be needed to cope with double the amount of oil being imported through Port X? (2)

3.5.4 Explain why the construction of a large drydock at Port X will provide a major asset to the country in general, as well as to Port X and its surrounding area in particular. (10)

3.5.5 If more ships will call at Port X, what else (besides any new berths) will the port authorities have to plan for? (8)

3.6. Which maritime code or convention deals with each of the following?

3.6.1 Dumping of bilge water (2)

3.6.2 The number of lifeboats and life rafts on a ship (2)

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QUESTION 4 MARINE ENVIRONMENTAL CHALLENGES

4.1 While bunkering in Port Z, a vessel accidentally spilled 5 tons of bunker fuel. The ship was detained immediately by the authorities for three days until US\$4 million had been placed as security against the costs of cleaning up the oil spill. The clean-up cost US\$1,5 million, and the Master of the vessel and two employees of the bunker company were fined US\$0.5 million each after being found responsible for the pollution. It was established that the ship was owned by a reputable company and insured properly. Once the fines and costs of the clean-up had been paid, the balance of the US\$4 million was refunded by the authorities.

4.1.1 Explaining the reasons for your opinion, comment on the fines imposed by the authorities on the ship's master and other personnel. (4)

4.1.2 How much money was refunded to the owners? (4)

4.2 A heavylift ship carrying a large oilrig is on passage in the US Gulf and is en route to West Africa in September. Why is it important for the master of the heavylift ship to study weather patterns during this voyage at that time of the year? (4)

4.3 While on passage from Durban to Cape Town in June, the Master of the 4 000-teu containership *Kudu* notes the following weather forecast for the sea area from Cape Agulhas to East London, through which his ship will pass during the next 12 hours:

WIND	GALE WARNING: WESTERLY 15 KNOTS, STRENGTHENING TO 30 KNOTS FROM THE WEST AND GUSTING TO 40 KNOTS AT TIMES.
SEA STATE	SWELL SW 6 METRES, BECOMING 8 TO 10 METRES LATER
WEATHER	SHOWERS, HEAVY AT TIMES
VISIBILITY	POOR IN THE RAIN

4.3.1 Will *Kudu* be heading into the swell or steaming with the swell? (2)

4.3.2 What weather feature would have caused the conditions described in the forecast? (2)

4.3.3 How long would this weather last in the area between Cape Agulhas and East London? CHOOSE YOUR ANSWER FROM: 12 HOURS; 36 HOURS; 48 HOURS. (2)

4.3.4 What serious problem could heavy swell cause for a containership? (2)

4.4 Because of a bitter dispute, the sea fisheries' patrol vessels and their research ships were laid up in Simon's Town from March 2012.

4.4.1 Why was it a serious problem that the South African fisheries' patrol vessels were laid up for so long? (6)

4.4.2 Why was it a serious problem that only a limited amount of fisheries research was done last year and for part of this year? (4)

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Total: 300 marks