



## Western Australian Certificate of Education Examination, 2010

### Question/Answer Booklet

# MARINE AND MARITIME TECHNOLOGY

## Stage 3

Please place your student identification label in this box

Student Number: In figures

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In words

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### Time allowed for this paper

Reading/planning time before commencing work: ten minutes

Working time for paper: three hours

### Materials required/recommended for this paper

#### *To be provided by the supervisor*

This Question/Answer Booklet

Multiple-choice Answer Sheet

#### *To be provided by the candidate*

Standard items: pens, pencils, eraser, correction fluid/tape, ruler, highlighters

Special Items: non-programmable calculator satisfying the conditions set by the Curriculum Council for this course; 360° protractors or Douglas protractors; compasses

### Important note to candidates

No other items may be taken into the examination room. It is **your** responsibility to ensure that you do not have any unauthorised notes or other items of a non-personal nature in the examination room. If you have any unauthorised material with you, hand it to the supervisor **before** reading any further.

**Structure of this paper**

Section	Number of questions available	Number of questions to be answered	Suggested working time (minutes)	Marks available	Percentage of exam
Section One: Multiple-choice	20	20	30	20	20
Section Two: Short answer	5	5	40	60	30
Section Three: Compulsory extended answer	1	1	40	40	20
Section Four: Extended answer	4	2	70	60	30
<b>Total</b>					100

**Instructions to candidates**

1. The rules for the conduct of Western Australian external examinations are detailed in the *Year 12 Information Handbook 2010*. Sitting this examination implies that you agree to abide by these rules.

2. Answer the questions according to the following instructions.

Section One: Answer all questions on the separate Multiple-choice Answer Sheet provided. For each question shade the box to indicate your answer. Use only a blue or black pen to shade the boxes. If you make a mistake, place a cross through that square, do not erase or use correction fluid, and shade your new answer. Marks will not be deducted for incorrect answers. No marks will be given if more than one answer is completed for any question.

Sections Two, Three and Four: Write answers in this Question/Answer Booklet.

3. You must be careful to confine your responses to the specific questions asked and to follow any instructions that are specific to a particular question.
4. Spare pages are included at the end of this booklet. They can be used for planning your responses and/or as additional space if required to continue an answer.
  - Planning: If you use the spare pages for planning, indicate this clearly at the top of the page.
  - Continuing an answer: If you need to use the space to continue an answer, indicate in the original answer space where the answer is continued, i.e. give the page number. Fill in the number of the question(s) that you are continuing to answer at the top of the page.

## Section One: Multiple-choice

20% (20 Marks)

This section has **twenty (20)** questions. Answer **all** questions on the separate Multiple-choice Answer Sheet provided. For each question shade the box to indicate your answer. Use only a blue or black pen to shade the boxes. If you make a mistake, place a cross through that square, do not erase or use correction fluid, and shade your new answer. Marks will not be deducted for incorrect answers. No marks will be given if more than one answer is completed for any question.

Suggested working time: 30 minutes.

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1. While approaching a port at night, you see directly ahead of you a marker buoy showing a white light, occulting, isophase, one long flash every 10 seconds. What type of mark is it?
  - (a) isolated danger mark
  - (b) north cardinal mark
  - (c) safe water mark
  - (d) special mark
  
2. After boarding a life raft and getting clear of the sinking vessel, you should stream the sea anchor to
  - (a) hold the life raft firmly to the sea bed.
  - (b) prevent the onset of seasickness.
  - (c) reduce the drift of the life raft.
  - (d) keep the life raft secured to the ship.
  
3. Voice radio communications sometimes require the use of the 'phonetic alphabet' to assist in the correct interpretation of a word or words. The official phonetic word for the letter 'S' is
  - (a) Sam.
  - (b) Sugar.
  - (c) Sydney.
  - (d) Sierra.
  
4. The signal from a 406 MHz distress beacon (EPIRB) is transmitted directly to
  - (a) all ships in the vicinity.
  - (b) a system of satellites.
  - (c) Global Positioning Systems (GPS).
  - (d) marine radio receivers.
  
5. If you had to cross a sand bar showing a charted depth (sounding) of 5.0 metres, and you had a height of tide of 2.0 metres and a ship's draught of 4.0 metres, what would be the underkeel clearance when crossing the sand bar?
  - (a) 2.0 metres
  - (b) 3.0 metres
  - (c) 5.0 metres
  - (d) 7.0 metres

**See next page**

6. A ship receiving a digital selective calling (DSC) distress alert on VHF Channel 70 should reply on
- (a) Channel 16.
  - (b) Channel 70.
  - (c) any channel.
  - (d) all channels.
7. The price of a fully grown Southern Blue Fin Tuna is very high because
- (a) adult tuna are really rare and there are bag and size limits.
  - (b) aquaculturists need to recoup all the money they spend on farming tuna.
  - (c) they are so big that enormous quantities of fish meat is gained from them.
  - (d) they are a delicacy in the Japanese food market as sashimi and sushi.
8. On high energy sandy coasts, the most important function of a hard artificial reef is to
- (a) protect popular beaches from sand erosion.
  - (b) create new surfing areas for a growing sport.
  - (c) provide a new base for underwater ecosystems under threat.
  - (d) create new areas for the tourism industry for diving expeditions.
9. A free diver has a lung capacity of 3.3 L at 7 m water depth. When the diver returns to the surface, his lung capacity will be closest to
- (a) 3.4 L.
  - (b) 2.3 L.
  - (c) 5.6 L.
  - (d) 4.2 L.
10. The disposal of plastics from a vessel is
- (a) permitted in all areas.
  - (b) prohibited in all areas.
  - (c) only allowed within coastal waters.
  - (d) only allowed within inland waters.
11. If the true course using a magnetic compass was 050° and the compass error was 2°W, what would be the compass course to steer?
- (a) 050°
  - (b) 048°
  - (c) 052°
  - (d) 053°

12. The chemical PEG is used to replace water in wooden shipwreck artefacts as part of the process of preservation. Its full name is
- (a) polyethene glycerol.
  - (b) polyethanol glycerine.
  - (c) polyethylene glycol.
  - (d) proethylene glycerol.
13. The most significant disadvantage of electricity produced by wave power is that
- (a) waves are dependent on weather systems so electricity production is unreliable.
  - (b) the generating structures at sea are shipping hazards.
  - (c) ocean swells can be erratic, as waves can cancel each other.
  - (d) maintenance is a difficult and dangerous job.
14. An example of a zooplankton that is an immature part of an animal's life cycle is a
- (a) copepod.
  - (b) diatom.
  - (c) dinoflagellate.
  - (d) medusa.
15. What is the minimum qualification required to legally operate a VHF DSC communications system?
- (a) Global Maritime Distress and Safety System Operators Certificate
  - (b) Marine Radio Operators Certificate of Proficiency
  - (c) Marine Radio Operators Certificate of Proficiency with Satellite Endorsement
  - (d) Marine Radio Operators VHF Certificate of Proficiency
16. Which one of the following is **not** a characteristic of zooplankton?
- (a) Zooplankton move vertically in the water column.
  - (b) Zooplankton can be photosynthetic.
  - (c) Zooplankton can reproduce sexually or asexually.
  - (d) Zooplankton consume the larval stages of fish and other benthic organisms.
17. A radar target is first detected at a range ( $d$ ) of 23 nm. If the height of the radar scanner ( $h$ ) is 16 metres, what would be the approximate height ( $H$ ) of the target? Answer to the nearest whole metre.
- Formula: 
$$H = \left( \frac{d - (2.23 \times \sqrt{h})}{2.23} \right)^2$$
- (a) 23 metres
  - (b) 16 metres
  - (c) 30 metres
  - (d) 40 metres

18. Mangrove and seagrass communities are two of the most productive biological ecosystems because they are both
- (a) sources of a large biodiversity of food and shelter to juvenile marine creatures.
  - (b) inaccessible to predators when the tide comes in.
  - (c) inaccessible to humans and fisheries as nets are difficult to use.
  - (d) less prone to human damage due to their remote locations.
19. Sand on beaches can come from the erosion of
- (a) river sediments at entrances to the sea.
  - (b) river sediments and beach cliffs.
  - (c) river sediments, cliffs and marine organisms.
  - (d) river sediments, cliffs and urban storm run-off.
20. The instrument known as an 'anemometer' is used on board a vessel to measure
- (a) barometric pressure.
  - (b) atmospheric temperature.
  - (c) wind speed and direction.
  - (d) relative humidity.

**End of Section One**

**See next page**

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Section Two: Short answer

30% (60 Marks)

This section has **five (5)** questions. Answer **all** questions. Write your answers in the spaces provided.

Spare pages are included at the end of this booklet. They can be used for planning your responses and/or as additional space if required to continue an answer.

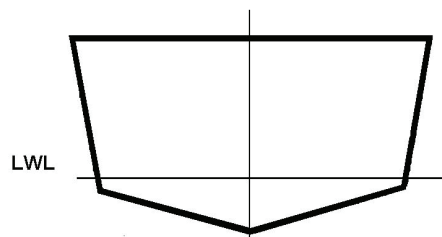
- Planning: If you use the spare pages for planning, indicate this clearly at the top of the page.
- Continuing an answer: If you need to use the space to continue an answer, indicate in the original answer space where the answer is continued, i.e. give the page number. Fill in the number of the question(s) that you are continuing to answer at the top of the page.

Suggested working time: 40 minutes.

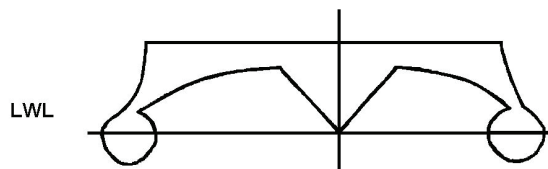
Question 21

(12 marks)

- (a) Describe in detail the performance advantage of a wavepiercer hull over a hard chine monohull. (LWL is Level Water Line) (6 marks)



Hard Chine Monohull



Wavepiercer

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- (b) Sea water is denser than fresh water. Explain whether a vessel will float higher in sea water than it will in fresh water. (3 marks)

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- (c) For a 3 m vessel with a 10 horsepower outboard engine, describe how you would handle the engine gearing and the tiller when coming alongside a jetty in calm weather on a slack tide. (3 marks)

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**Question 22**

**(12 marks)**

Working on board a vessel can sometimes involve long hours, noise and broken sleep. The resulting fatigue can lead to human errors.

- (a) Discuss **three (3)** ways in which these human errors can be avoided. (6 marks)

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- (b) List **six (6)** actual or potential working hazards to which crew members can be exposed on board any vessel. (6 marks)

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Question 23

(12 marks)

Explain, using scientific terms, each of the reasons given below for the movement of winds and global ocean currents in the southern hemisphere.

(a) Coriolis or the Earth's rotational effect

(4 marks)

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(b) Ocean temperature differences

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- (c) Seasonal differences in ocean salinity at the polar icecaps (4 marks)

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**Question 24 (14 marks)**

The 'Roaring Forties' is a term used to describe strong winds and seas in the southern hemisphere. Their discovery in the 1600s led to the opening of new trade routes.

- (a) What **two (2)** new trade routes were opened? For each route, list **two (2)** major products transported. (4 marks)

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- (b) What is the prevailing wind direction and strength south of the Cape of Good Hope and into the Indian Ocean? How did the absence of land forms in the region of ocean affected by the 'Roaring Forties' winds contribute to the 6500 shipwrecks around the Australian coast? (6 marks)

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- (c) Several new navigational technologies developed during the 1600s helped to allow ships safe passage through the 'Roaring Forties'. Name and describe **two (2)** examples of these technologies. (4 marks)

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**Question 25**

**(10 marks)**

- (a) Explain what is meant by a 'Marine Protected Area' and state who is responsible for its management. (4 marks)

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- (b) Explain how Marine Protected Areas can achieve the functions listed below.

- (i) Conservation of marine biodiversity (3 marks)

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- (ii) Strategies for fisheries management (3 marks)

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**End of Section Two**

**See next page**

**Section Three: Compulsory extended answer**

**20% (40 Marks)**

This section contains **one (1)** question. You must answer all parts of the question. Write your answers in the spaces provided.

Spare pages are included at the end of this booklet. They can be used for planning your responses and/or as additional space if required to continue an answer.

- Planning: If you use the spare pages for planning, indicate this clearly at the top of the page.
- Continuing an answer: If you need to use the space to continue an answer, indicate in the original answer space where the answer is continued, i.e. give the page number. Fill in the number of the question that you are continuing to answer at the top of the page.

Suggested working time: 40 minutes.

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**Question 26**

**(40 marks)**

Coastal erosion on high energy sandy beaches is a major problem.

- (a) Explain, using diagrams, how longshore drift and storm waves move sand from a sandy beach, causing erosion. (10 marks)

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(b) Some buildings have been erected dangerously close to high energy coastlines. Engineers have used many processes and structures to reduce sand erosion by longshore drift.

(i) Describe **one (1)** construction technique and **one (1)** other method of foreshore protection that have been used to limit the effects of longshore drift. (8 marks)

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**Section Four: Extended answer****30% (60 Marks)**

This section contains **four (4)** questions. You must answer **two (2)** questions. Write your answers on the lined pages provided following question 30.

Spare pages are included at the end of this booklet. They can be used for planning your responses and/or as additional space if required to continue an answer.

- Planning: If you use the spare pages for planning, indicate this clearly at the top of the page.
- Continuing an answer: If you need to use the space to continue an answer, indicate in the original answer space where the answer is continued, i.e. give the page number. Fill in the number of the question(s) that you are continuing to answer at the top of the page.

Suggested working time: 70 minutes.

**Question 27****(30 marks)**

This question refers to chart AUS 252 on pages 20 and 21.

- (a) What type of navigation beacon is located on Platypus Rock? Describe its characteristics. (3 marks)
- (b) What is the full meaning of the chart symbol located at 20°30.4'S-148° 58.5E? (3 marks)
- (c) On the extract from chart Aus 252, lay off a course from a position in 20°48.0'S – 149°00.0'E to pass 1 nm clear to the seaward side of Io Reef Light. From the position exactly abeam of this light lay off a new course to pass 1 nm clear to the east of Coppersmith Rock Light; then, when abeam of this light, set a new course to position 20°30.0'S - 149°09.1'E.
- Note:** 'Abeam' means at 90° to your course.
- (i) What is the direction of each course? (12 marks)
- (ii) What is the distance along each course? (6 marks)
- (iii) How long would it take to travel the total distance at a speed of 11.5 knots? (3 marks)
- (iv) If your initial time of departure was 1655 what would be your estimated time of arrival (ETA)? (3 marks)

**Question 28****(30 marks)**

- (a) In the past year there has been a great deal of media coverage of the ongoing conflict between whaling ships and the vessels of conservation societies, in particular the Greenpeace organisation.
- (i) Explain why many species of whale are now listed as being endangered or vulnerable as a result of developments in the techniques used by whalers. (5 marks)
- (ii) List **five (5)** factors other than whaling that influence the populations of many species of whale. (5 marks)
- (b) Many Australians oppose whaling for social, cultural and environmental reasons. Discuss each of these reasons in detail. (12 marks)
- (c) Describe how non-government organisations such as Greenpeace oppose whaling. (8 marks)

**See next page**

**Question 29****(30 marks)**

- (a) Human activities, such as carbon dioxide emissions from vehicles and power plants, may be causing atmospheric temperature increases. Explain how changes in the composition of the atmosphere may lead to global warming. (10 marks)
- (b) Explain the effect of global warming on
- (i) polar ice caps (5 marks)
  - (ii) global weather systems (5 marks)
  - (iii) coastal biological and human communities. (5 marks)
- (c) We need to think about how our society can reduce carbon dioxide emissions. List **five (5)** ways in which you can reduce your personal contribution to our society's carbon dioxide emissions. (5 marks)

**Question 30****(30 marks)**

Corals respond to small changes in their environments. If environmental conditions exceed the corals' threshold, bleaching or other damage may occur.

- (a) Explain the process of coral bleaching. (5 marks)
- (b) Explain how each of the following situations could cause coral bleaching or damage.
- (i) Rise in sea surface temperature (5 marks)
  - (ii) Ocean acidification (5 marks)
  - (iii) Coastal/urban runoff (5 marks)
  - (iv) Tourism (5 marks)
  - (v) Changes in global sea levels (5 marks)

**End of questions**





































## ACKNOWLEDGEMENT

### Section Four

- Question 27** Australian Hydrographical Service. (2005). *Navigation Chart AUS 252: Australia – East Coast-Queensland Whitsunday Group*. Australian Hydrographical Service.

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