



**DIRECTORATE OF MERCHANT SHIPPING  
GOVERNMENT OF SRI LANKA  
CERTIFICATE OF COMPETENCY EXAMINATION**

GRADE : CHIEF MATE ON SHIPS OF 500 GT OR MORE (UNLIMITED)  
SUBJECT : NAVIGATION  
DATE : 24<sup>th</sup> November 2017

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Time allowed <b>THREE hours</b>	Total marks : 185
<b>ANSWER ALL QUESTIONS</b>	Pass marks : 70%

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Formulae and all intermediate steps taken in reaching your answer should be clearly shown. You may draw sketches wherever required. Electronic devices capable of storing and retrieving are **not** allowed.

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**For all questions, please note the vessel and the voyage details are as follows;**

Type of the vessel : General cargo vessel  
Gross Tonnage : 200360 GT  
Voyage from : San Francisco (USA)  
To : Southern Philippines  
Departure draft : 21.80 m (Vessel loaded to her maximum permissible load line marks at departure)  
Date of departure : 3<sup>rd</sup> July  
TPC : 30.5 tcm<sup>-1</sup>

Vessel's machinery and all navigational aids are functioning without any defects; The vessel consumes 41 t of fuel and 9 tons of fresh water each day when steaming at service speed of 16.25 knots; The master is advised to achieve the quickest possible passage while complying with all international regulations.

The southern limit of northern winter load line zone IS latitude 36<sup>o</sup> 00' N.

Following documents are provided along with this paper:

- a) Radar plotting sheet
- b) Graph paper
- c) Graph 'FOR FINDING THE HEIGHT OF THE TIDE AT TIMES BETWEEN HIGH AND LOW WATER'

## QUESTIONS

1. Departure position:  $34^{\circ} 30' \text{ N}$ ,  $121^{\circ} 00' \text{ W}$   
Landfall position:  $10^{\circ} 40' \text{ N}$ ,  $126^{\circ} 00' \text{ E}$
- a) Calculate the minimum legal distance along the GC route. (15 marks)
- b) Find the final course on the great circle track. (10 marks)
- c) Calculate the steaming time to International Date Line (IDL), assuming the vessel maintains her service speed throughout the passage. (10 marks)
- 2.
- a) Explain the terms
- i. Sole lookout
  - ii. Archipelagic sea lane
- (05 marks each)
- b) State the factors to consider when you post a sole lookout on the navigation bridge. (05 marks)
- c) Explain the general principles to be followed for various ship reporting systems. (10 marks)
- d) State the circumstances the OOW should call the master on the bridge (10 marks)
3. Master decides to verify the position using stellar observations when the vessel was transiting the highest latitude along the route. Determine the position at 1900LT, assuming,
- a) Vessel was on course  $270^{\circ} \text{ (T)}$
  - b) Maintained her service speed of 16.25 knots
  - c) DR position  $36^{\circ} 00' \text{ N}$ ,  $156^{\circ} 50' \text{ W}$ .

Time	Object	Azimuth	TZD	CZD
1850	Rigel	$023^{\circ} \text{(T)}$	$44^{\circ} 15'.70$	$44^{\circ} 13'.40$
1855	Vega	$061^{\circ} \text{(T)}$	$57^{\circ} 43'.15$	$57^{\circ} 45'.00$
1905	Canopus	$151^{\circ} \text{(T)}$	$36^{\circ} 54'.25$	$37^{\circ} 00'.00$
1910	Arcturus	$296^{\circ} \text{(T)}$	$42^{\circ} 55'.20$	$42^{\circ} 52'.00$

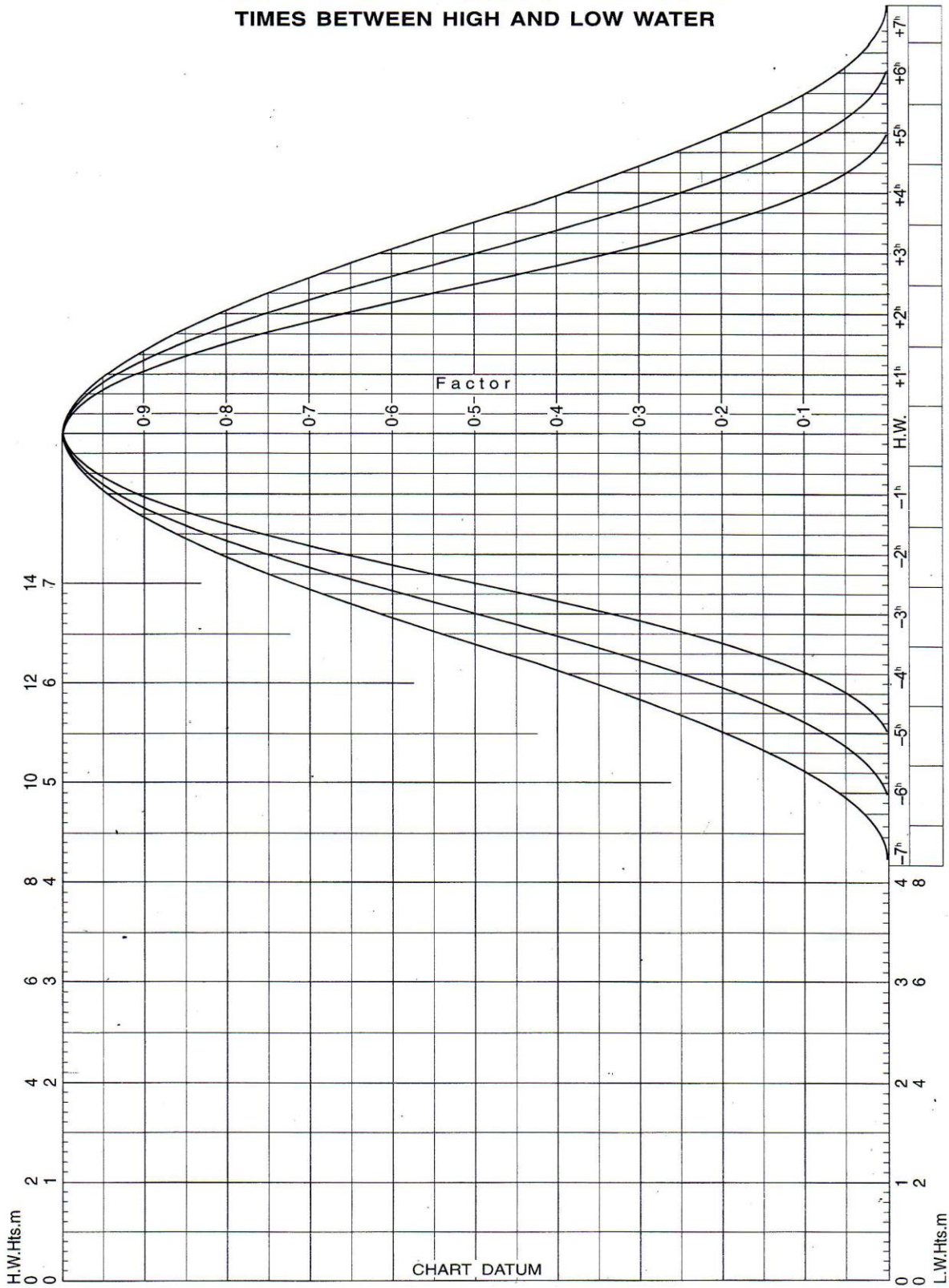
(30 marks)

4. A vessel on a South Westerly course is making a passage through the TRS region of the Western South Pacific in March.
- Give details of a bridge routine which will ensure that the vessel does not encounter a storm unexpectedly. (10 marks)
  - If a TRS is detected explain how the master may ascertain the vessel's position relative to the storm's path by onboard observations. (10marks)
  - A TRS on a SSE track is reported abaft the starboard beam at a range of about 150nm and onboard observations reveal that the vessel is in the advance left quadrant. State the action to be taken by the master to avoid the worst of the storm. (10 arks)
5. Extracts from Admiralty Tide Tables are shown below for Golden Gate, San Francisco, USA on 3<sup>rd</sup> July.

Time Zone +0800	TIME	HEIGHT
Lat 37 <sup>0</sup> 48' N	0321	- 0.5
	1040	1.4
Long 122 <sup>0</sup> 27' W	1418	0.2
	2111	1.9

- Find the height of tide at 0920Hrs local time. (15 marks)
  - Find the earliest time for the vessel to cross the bar marked 21 m with an under-keel clearance of 1m. (15 arks)
6. At 0600 hrs UT on the 25<sup>th</sup> September a vessel receives a request from MRCC Halifax to take part in a search and rescue (SAR) operation for 16 person life raft after the crew has abandoned the vessel following an explosion onboard.
- Outline factors to be considered when choosing a vessel to act as the On Scene Coordinator (OSC) during search and rescue operations. (10 marks)
  - State the publications that should be consulted during a SAR operation. (05 marks)
    - Outline the information that is available to determine a search datum position, from the publications stated in Q6(b)(i). (05 marks)
  - Explain with the aid of a sketch, the method used to determine a datum search position, assuming the distress position is known. (10 marks)

**FOR FINDING THE HEIGHT OF THE TIDE AT  
TIMES BETWEEN HIGH AND LOW WATER**



## Answers

1.

i)

GC 1<sup>st</sup> leg dist: 930Nm

GC 2<sup>nd</sup> leg dist: 4298.7Nm

Parallel leg: 927.3Nm

Total dist: 6156Nm

ii) dist<sub>V<sub>2</sub>D</sub> = 1033.9Nm, total dist AD = 2891.2Nm, Steaming time = 177.2Hrs, 07D-09H-55M (7D-10H)

2. From the plot

D lat = 5.3'

Dep = 3.7'

Fix: Lat: 35-54.7N, Long: 152-15.4W

5. From the plotting in Tidal diagram

At 0920 = 1.20m to 1.25m

Earliest time with 1m UKC = 1956LT