MERCHANT SHIPPING SECRETARIAT
GOVERNMENT OF SRI LANKA
CERTIFICATE OF COMPETENCY EXAMINATION

GRADE : CHIEF MATE ON SHIPS OF 500 GT OR MORE (UNLIMITED)
SUBJECT : Navigation
DATE : 29.08.2023

Time allowed **THREE hours** Total marks : 180
ANSWER ALL QUESTIONS Pass marks : 70%

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.

1) A vessel is to make a passage through Great Circle from Auckland, New Zealand to Panama.
Departure position off Auckland : 36^0 36.0'S, 174^0 49.0'E
Landfall position off Panama : 07^0 00.0'N, 080^0 00.0'W
The extra distance under pilotage and whilst coasting is 230 Nautical Miles.
Calculate each of the following:
   a) The total distance from Auckland to Panama
   (10 marks)
   b) The initial course on passage
   (10 marks)
   c) The position of the vertex
   (10 marks)
   d) The longitude in which the track crosses the Equator
   (10 marks)

2)
   a) State the factors to be considered by a master when selecting optimum route for an ocean passage.
   (15 marks)
   b) Briefly describe;
      i. Least time route
      ii. Least time with least damage route
      iii. Least damage route
      iv. Constant speed route
   (05 marks each)

3) Find the height above sea level of a light house whose charted height is 41.0m at Darwin, Australia, at 0930 hrs on 22nd November. Extracts from Admiralty Tide Tables are given below:

Darwin, Australia		
Lat 12^0 28.0' S, Long 130^0 51.0' E		
MHWS 6.90 m		
22nd Thursday	0107	2.40
	0634	6.50
	1312	0.50
	1947	7.60

(20 marks)

4)

a) Discuss the pre-departure checks and monitoring techniques (during voyage) required to be performed on a vessel fitted with ECDIS.

(15 marks)

b) List down the situations that the master should have advised the OOW to call him.

(10 marks)

5) A cruise ship is bound from West Indies to Cape Town, South Africa and is steering a course of 127^0(T) at 20 knots.
At 0600 hrs ship's time, the vessel's DR position is $24^0$35.0'S, $003^0$24.0'W. Despite cloudy conditions, the ship's OOW manages to obtain stellar sights spread over a period. The above DR position was used to calculate all four position lines.

Ship's time	Star	Azimuth	Intercept
0554	A	285^0	2.0'Towards
0603	B	262^0	1.5'Towards
0615	C	044^0	4.0'Away
0624	D	167^0	10.0'Towards

Find the vessel's most probable position at 0615 hrs.
In case of plotting, use the following scale:
1 cm = 1 nautical mile

(30 marks)

6)

a) List down the precautions you should be observing in or near a traffic separation scheme.

(10 marks)

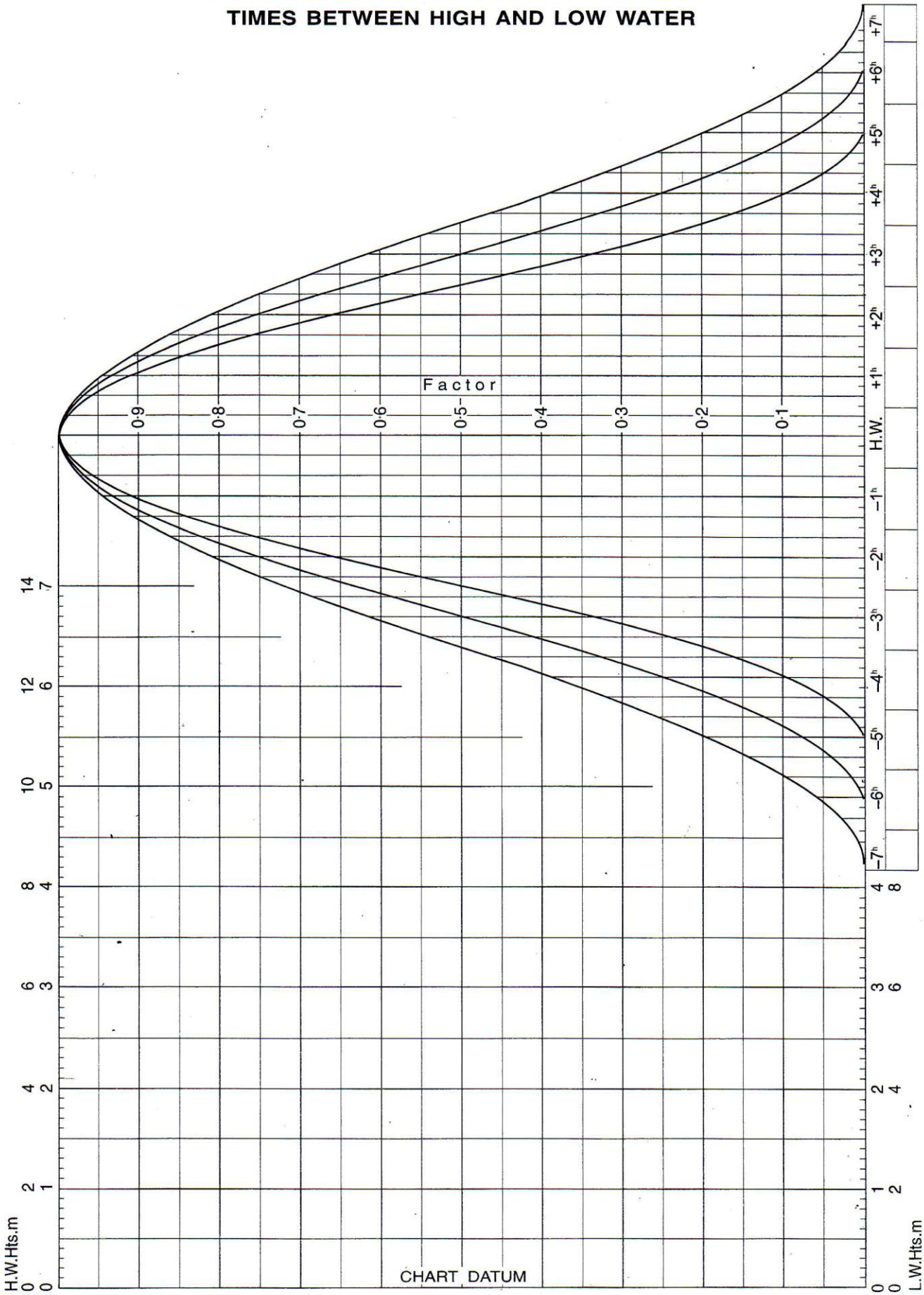
b) Describe how to perform a crash manoeuvring.

(05 marks)

c) Describe the actions to be taken after a collision.

(15 marks)

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



Answers

1.

a) 6380 (10 marks)
b) 0930(T) (10 marks)
c) 36044.0’S, 179029.0’W (10 marks)
d) 89029.0’W (10 marks)

2.

a)

sample factors to be considered are:

- Displacement of the ship
- Draught of the ship
- Engine power of the ship
- Ports to be called at
- Least depth/shallow water along the route
- Hazards along the route
- Land, islands or reefs along the route
- Load Line zones

Variable Factors

- Present and forecast weather, which affects (or may affect) the sea state and the swell may require a reduction of the speed or may cause damage
- Effects of reduced visibility on speed of progress (safe speed)
- Navigational warnings or reports
- War zones
- Piracy attacks or other hostile activities

(15 marks)

b)

i. **Least time**: The objective being to reduce time on passage and is usually applicable to Tanker vessels. This type of vessel is less likely to sustain hull damage and will not suffer the possibility of cargo damage.

(10 marks)

ii. **Least time with Least Damage**: The objective with the option is to reduce and minimize damage costs. This objective is probably the most widely used by vessels engaging in weather routing service.

(10 marks)

iii. **Least Damage**: The objective being to sustain minimum damage, an option for vessels with particularly sensitive cargoes. e. g. livestock, vehicles etc.

(10 marks)

iv. **Constant Speed**: A requirement often stipulated by charter parties is that the vessel maintains a given speed throughout the period of passage.

(10 marks)

3.

Height of tide at 0930Hrs	4.04m
Difference between MHWS & Height of tide	6.90 – 4.04 = 2.86m
Charted height of light house	41.0m
Height of light house above sea level at 0930Hrs	41.0 + 2.86 = 43.86m

(20 marks)

4.

a.

- Correct passage plan is loaded on primary and secondary ECDIS terminals.
- Correct depth contours are set according to actual drafts.
- All information feeds & sensors from other sources are functioning (gyro, speed log, echo sounder, GPS, radar).
- Route safety check performed and validated
- Appropriate charts as per scales available
- All charts corrected to latest notices to mariners

- No go areas, Contingency anchorages, reporting points, reporting details, wheel over positions, exercise zones, firing areas, Navtex warnings, T&Ps are entered as manual updates or user maps as appropriate.
- Look ahead values and cross track values are set and adjusted as per requirements of surrounding area and depth.
- Selecting the available information layers without cluttering the display to avoid information overload
- AIS target filtering used in order not to clutter the display.
- LOPs used to compare position fixing
- Parallel indexing used for position monitoring
- Appropriate use of true and relative vector settings and appropriate selection of vector lengths as per surrounding area
- Use of RIO

(15marks)

b.

- When restricted visibility is expected, or encountered.
- When traffic conditions or movements of other ships are causing concern.
- When difficulty is experienced in maintaining course.
- On failure to sight land, navigation marks or obtain soundings by the expected time.
- When unexpectedly land or sightings or soundings are encountered.
- When the soundings disagree with the soundings on the chart along vessel's track.
- Any indication of shallow water not mentioned on the chart.
- At breakdown of propulsion, steering, or any essential navigational equipment, alarm or indicator.
- When critical radio equipment malfunctions.
- When weather unexpectedly deteriorates.
- When any hazard to navigation is sighted.
- When a distress alert of a ship or a distress relay from a coast station is received regarding a distress situation existing in own ship's vicinity.
- When a significant change of weather parameters is noticed such as sudden shift in wind direction and/or increase in wind speed.
- When in any doubt about matters relating to the safety of navigation or security status of the ship or prevention of pollution.
- Any serious irregularity in preparing to relieve or surrender the watch.

(10 marks)

5.

The vessel's most probable position at 0615, 24^{0}42.0'S, 003^{0}21.0'W

(30 marks)

6.

a.

- Always observe Colregs
- Proceed in the appropriate lane in the direction of traffic flow for that lane
- Keep clear of a traffic separation line or separation zone
- Join or leave a traffic lane at its end where possible
- When joining or leaving a traffic lane from either side, do so at as small an angle as possible to the general direction of traffic flow
- Cross the traffic lanes at right angles
- Navigate with particular caution in areas where traffic lanes terminate or where there is a precautionary area
- Avoid anchoring in Traffic Separation Scheme at or near its terminations
- Avoid entering a separation zone or cross a separation line except in case of emergency or to avoid immediate danger
- Avoid impeding the safe passage of a large vessel following the traffic lane

(10 marks)

b.

Crash manoeuvring is turning the engine in opposite direction to reduce the heading speed of the ship. After certain time, the ship stops and starts streaming in astern direction. This is done by supplying starting air at about 30 bars from the air receiver to the engine. The stopping air is known as the brake air.

(5 marks)

c.

- sound emergency muster alarm
- stop the vessel
- transmit distress or urgency signal on the radio (if necessary)
- evacuate passengers and crew to emergency stations
- ensure all people are accounted for and check for injuries

- prepare lifesaving equipment
- prepare to abandon (if situation deteriorates).
- ensure the safety of the vessel and all on-board
- determine the extent of damage
- sound tank/s
- inspect bilges or sound if enclosed
- observe for any oil, or fuel spills in the water around the vessel.
- contact the other vessel and give whatever assistance is necessary (without endangering your vessel) to ensure the safety of life of the people from both vessels
- produce documents and exchange adequate to identify the vessel and details of ownership
- stay by the other vessel until no further help is needed
- notify the authorities at the earliest opportunity but within 48 hours of the incident occurring (Check your State/Territory's' Legislation as to the exact length of time for reporting and who to report to)
- log details of event in the vessel log book or record book as soon as possible after the event
- attend to any injured person
- undertake an on-board inquiry and detail information
- if required show the appropriate signals

(15 marks)