MERCHANT SHIPPING SECRETARIAT
GOVERNMENT OF SRI LANKA
CERTIFICATE OF COMPETENCY EXAMINATION

GRADE : OFFICER IN CHARGE OF A NAVIGATIONAL WATCH ON SHIPS OF 500 GT OR MORE (UNLIMITED)
SUBJECT : COASTAL NAVIGATION
DATE : 24. 10. 2023 Time : 0900 to 1200 hrs

Time allowed **THREE hours** Total marks : 170
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) Answer the following questions with reference to the Data sheet – 1.
   a) It shows four tracks, state, with reasons, the tracks that comply and the tracks that do not comply with Rule 10 of International Collision Regulations.

   (16 marks)

   b) Identify the symbols 1, 2, 3, 4, 5, 6 and 7 in accordance with the BA 5011.

   (14 marks)

2)

a) Discuss the reliability of the tidal predictions contained in the Admiralty Tide Tables, giving reasons for discrepancies between predicted tidal heights and actual tidal heights.

(05 marks)

b) A vessel is to sail from Vancouver Harbour, British Colombia, on the 20th March. The Master instructs the OOW to determine the available time window on the morning high water tide, 20th March, that the vessel may cross a shoal.
Charted depth of shoal 9.5 m
Sailing draught fwd 11.1 m
Sailing draught aft 11.9 m
It is the Company requirement that a minimum under keel clearance of 10% of the maximum draught is required.
Find each of the following:
   i) The earliest time that the vessel may cross the shoal (in the morning)
   ii) The latest time that the vessel may cross the shoal (in the morning)

(10 marks each)

3) On completion of an ocean passage, a ship is to enter restricted navigational waters.
   a) State the factors to be considered when determining the bridge composition when navigation in restricted waters.

(10 marks)

   b) State the items of bridge equipment that should be checked prior to entering restricted waters.

(10 marks)

   c) State the factors to be considered when determining the frequency of position fixing in restricted waters.

(05 marks)

4) You are on a product tanker coming from Tokyo, Japan to "Western Petroleum A" anchorage ($1^0$14.45' N, 103^0 47.8' E), Singapore. The vessel entered Singapore strait during morning and the 0800 hrs GPS position observed to be 01^0 16.3' N, 104^0 04.7' E. The maximum draught of the vessel is 12.5 m, length overall is 190 m and her engine speed is 18 knts. She is equipped as required by the international regulations for her size and type. Calculate the following;
   a) Plot the position at 0800 hrs.

(05 marks)

   b) Plan the passage from the 0800 hrs position up to the above mentioned position in "Western Petroleum A". All the required information and the warnings shall be marked on the chart.

(35 marks)

   c) Port authority wants you to arrive at the anchoring position at 1000 hrs. Calculate the speed that must be maintained to arrive at the anchoring point at 1000 hrs.

(05 marks)

   d) While proceeding at the above calculated speed, she experiences a southerly current at the rate of 2 knts between longitudes 104^0 00' E and 103^0 56' E. Calculate the course to steer between these longitudes counteracting the current.

(10 marks)

   e) She drops her stbd anchor heading 045^0 (T) at 1015 hrs exactly at the position given above. At 1030 hrs, chief officer reports that she is brought-up with 5 shackles on the water. Draw the vessel's swinging circle.

(05 marks)

5) A container vessel bound for Tanjong Pagar Terminal is proceeding along the East bound traffic lane to receive pilot at Eastern Boarding A. vessel draws 10 m and capable of making 18 knots speed.

a) At 1030 hrs she observes a horizontal sextant angle of 50^0 between buffalo Rock isolated danger buoy (01^0 09.9' N, 103^0 48.15' E) and Karang Banteng pillar buoy with Racon 'K' (01^0 09.5' N, 103^0 48.83' E). At the same time Karang Banteng pillar buoy bore 085^0 (T). Fix the vessel's position at 1030 hrs.

(10 marks)

b) While following the East bound lane, vessel steered 064^0 (T) at 16 knots. At 1045 hrs the vessel observed the GPS position as 01^0 11.7' N, 103^0 52' E. fix the position of the vessel at 1045 hrs.

(05 marks)

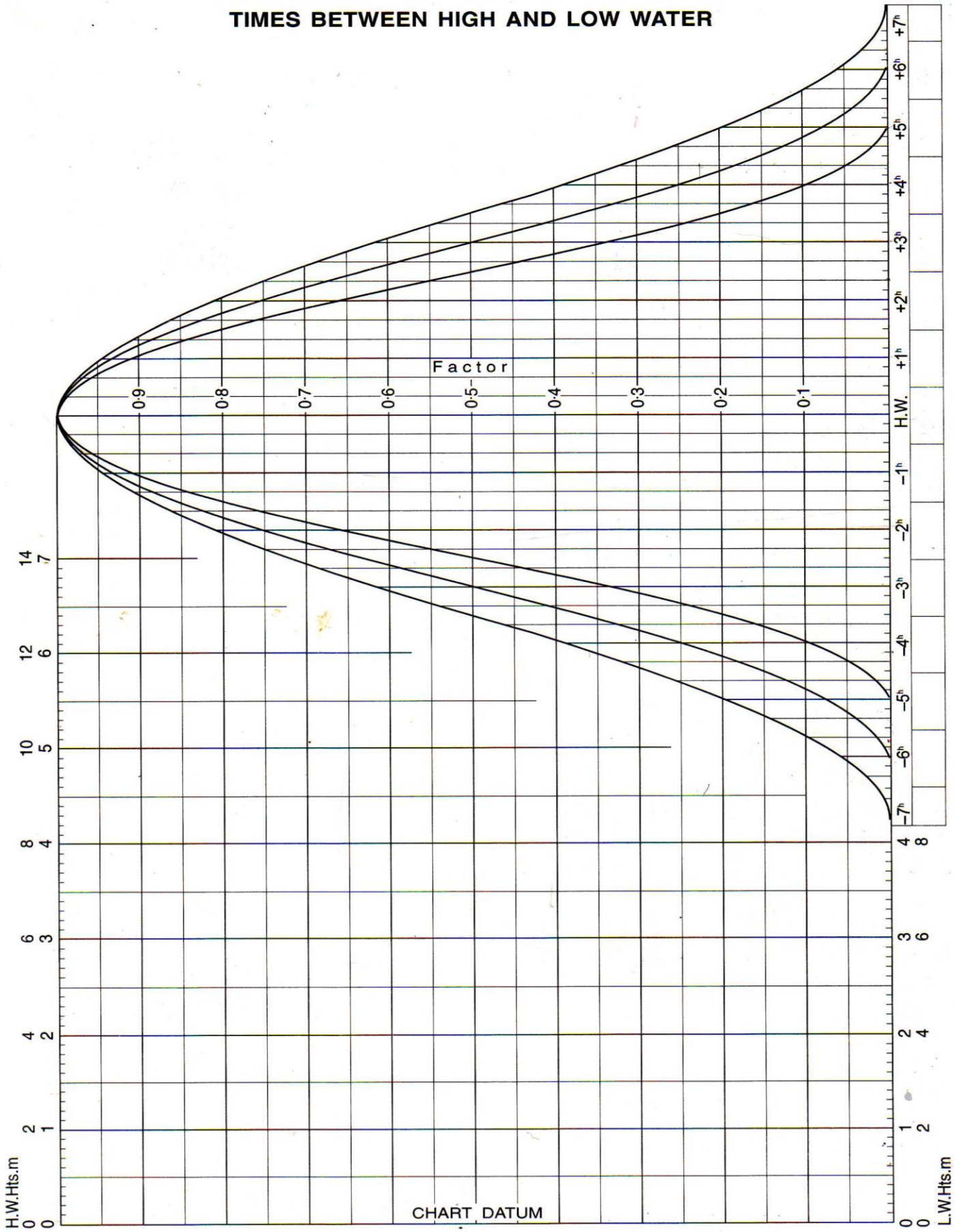
c) Find the set and drift experienced in above (b).

(10 marks)

d) What would be your course to steer if set and drift was known before to make good 064^0 (T).

(05 marks)

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



CANADA – VANCOUVER

LAT 49°17′N LONG 123°07′W

TIME ZONE **+0800**

TIMES AND HEIGHTS OF HIGH AND LOW WATERS

JANUARY

	Time	m		Time	m
1 SA	0305	3.7	**16** SU	0155	3.6
	0735	3.2		0625	3.0
	1315	4.3		1225	4.6
	2050	1.3		2000	1.2
2 SU	0405	4.0	**17** M	0315	4.0
	0850	3.4		0750	3.3
	1350	4.2		1310	4.5
	2130	1.1		2055	0.8
3 M	0455	4.2	**18** TU	0420	4.3
	0950	3.5		0905	3.4
	1425	4.2		1400	4.5
	2205	1.0		2145	0.5
4 TU	0535	4.4	**19** W	0510	4.6
	1040	3.5		1010	3.5
	1505	4.1		1455	4.5
	2245	0.8		2235	0.3
5 W ●	0610	4.6	**20** TH	0555	4.8
	1120	3.5		1105	3.4
	1540	4.1		1550	4.5
	2315	0.8		O 2320	0.2
6 TH	0645	4.6	**21** F	0635	4.9
	1200	3.5		1200	3.3
	1615	4.1		1650	4.5
●	2350	0.7			
7 F	0715	4.7	**22** SA	0010	0.2
	1235	3.4		0715	5.0
	1655	4.1		1255	3.1
				1745	4.3
8 SA	0025	0.7	**23** SU	0050	0.4
	0745	4.7		0755	5.0
	1315	3.4		1345	2.9
	1735	4.0		1845	4.1
9 SU	0055	0.8	**24** M	0135	0.7
	0815	4.7		0835	5.0
	1400	3.3		1440	2.7
	1815	3.9		1940	3.9
10 M	0130	0.9	**25** TU	0215	1.1
	0845	4.7		0910	4.9
	1445	3.1		1535	2.4
	1905	3.7		2045	3.7
11 TU	0205	1.2	**26** W	0255	1.6
	0920	4.7		0945	4.8
	1535	2.9		1635	2.2
	2000	3.6		2200	3.5
12 W	0240	1.4	**27** TH	0340	2.2
	0950	4.7		1020	4.6
	1630	2.7		1730	2.0
	2110	3.4		2335	3.4
13 TH	0325	1.8	**28** F	0425	2.7
	1025	4.7		1055	4.4
	1725	2.4		1825	1.8
	2230	3.3			
14 F	0410	2.2	**29** SA	0115	3.5
	1105	4.6		0535	3.1
	1815	2.0		1130	4.3
				1915	1.6
15 SA	0010	3.4	**30** SU	0240	3.8
	0510	2.6		0705	3.4
	1140	4.6		1210	4.1
	1910	1.6		2005	1.4
			31 M	0340	4.0
				0835	3.5
				1255	4.0
				2050	1.3

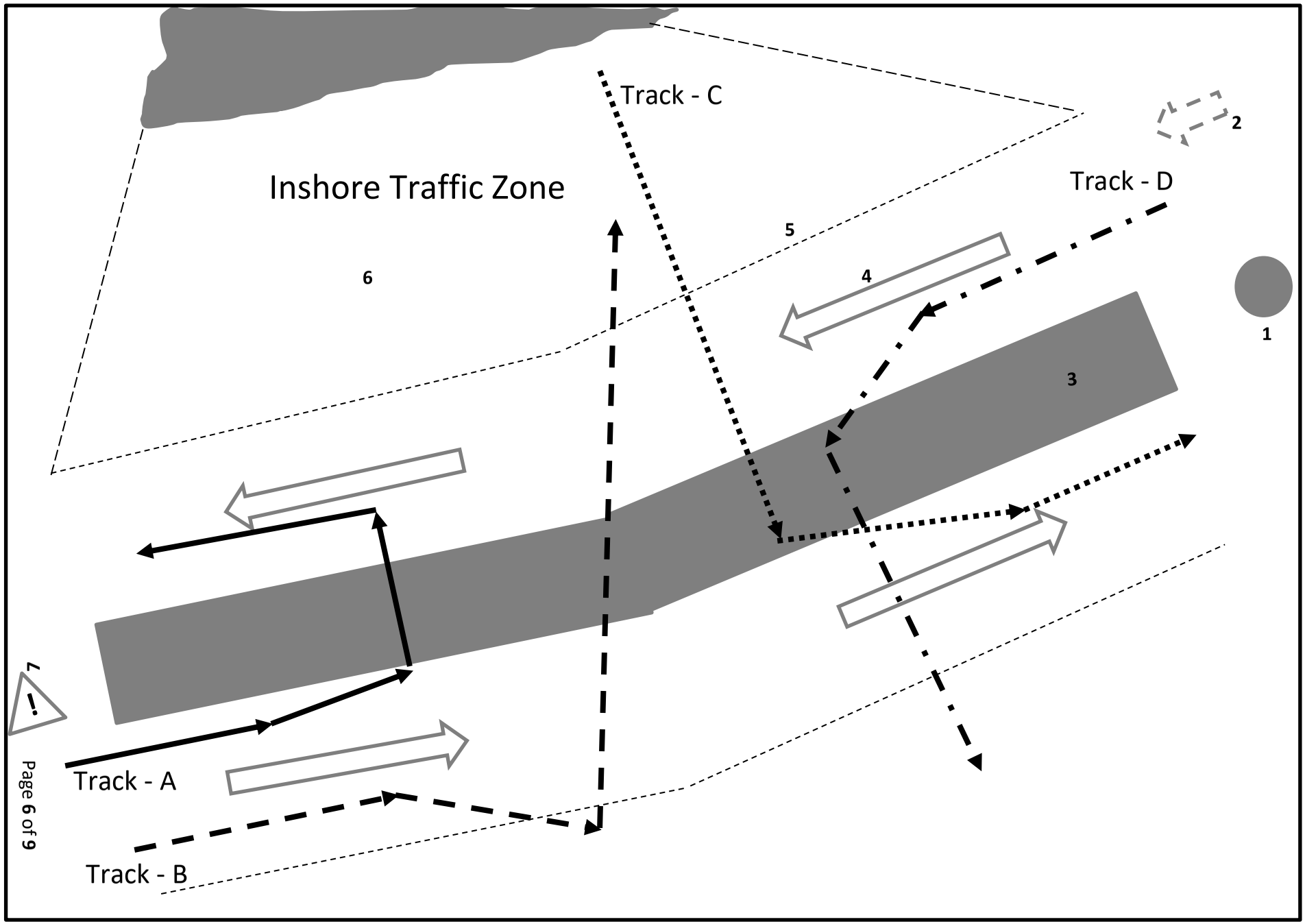
FEBRUARY

	Time	m		Time	m
1 TU	0430	4.2	**16** W	0400	4.4
	0940	3.5		0910	3.4
	1340	4.0		1345	4.2
	2135	1.1		2125	0.6
2 W	0505	4.4	**17** TH	0445	4.6
	1025	3.5		1010	3.3
	1430	4.0		1450	4.2
	2215	1.0		2215	0.5
3 TH	0540	4.5	**18** F	0530	4.7
	1105	3.4		1100	3.1
	1520	4.0		1600	4.3
	2255	0.9		2305	0.5
4 F	0615	4.6	**19** SA	0605	4.8
	1140	3.3		1150	2.8
	1610	4.0		1700	4.3
	2330	0.8		O 2350	0.6
5 SA ●	0645	4.6	**20** SU	0640	4.8
	1215	3.2		1235	2.6
	1655	4.1		1755	4.2
6 SU	0005	0.8	**21** M	0030	0.9
	0710	4.6		0715	4.8
	1250	3.1		1320	2.3
	1740	4.1		1845	4.1
7 M	0035	0.9	**22** TU	0110	1.2
	0735	4.6		0745	4.8
	1330	2.9		1405	2.1
	1825	4.0		1940	4.0
8 TU	0110	1.1	**23** W	0150	1.6
	0805	4.6		0820	4.7
	1410	2.7		1455	1.9
	1915	3.9		2040	3.8
9 W	0145	1.4	**24** TH	0230	2.1
	0830	4.6		0850	4.5
	1455	2.4		1540	1.8
	2010	3.8		2145	3.7
10 TH	0225	1.7	**25** F	0310	2.5
	0905	4.6		0920	4.3
	1540	2.2		1630	1.7
	2110	3.7		2310	3.7
11 F	0305	2.1	**26** SA	0355	3.0
	0935	4.6		0950	4.1
	1630	1.9		1720	1.7
	2230	3.6			
12 SA	0355	2.5	**27** SU	0035	3.8
	1010	4.5		0505	3.3
	1730	1.6		1020	4.0
				1810	1.6
13 SU	0005	3.7	**28** M	0155	3.9
	0455	3.0		0655	3.4
	1050	4.4		1105	3.8
	1825	1.3		1910	1.5
14 M	0145	3.9	**29** TU	0255	4.1
	0620	3.3		0830	3.4
	1140	4.3		1200	3.7
	1925	1.1		2005	1.5
15 TU	0300	4.2			
	0750	3.4			
	1235	4.2			
	2025	0.8			

MARCH

	Time	m		Time	m
1 W	0345	4.2	**16** TH	0325	4.5
	0925	3.3		0915	3.0
	1310	3.7		1350	3.8
	2055	1.4		2100	1.0
2 TH	0425	4.3	**17** F	0410	4.6
	1005	3.2		1005	2.8
	1415	3.7		1510	3.9
	2140	1.3		2155	1.0
3 F	0500	4.4	**18** SA	0450	4.6
	1040	3.1		1050	2.5
	1520	3.8		1615	4.0
	2225	1.2		2245	1.1
4 SA	0530	4.4	**19** SU	0525	4.6
	1115	2.9		1130	2.2
	1610	3.9		1710	4.1
	2300	1.1		O 2330	1.3
5 SU ●	0555	4.5	**20** M	0555	4.6
	1145	2.7		1210	1.9
	1655	4.0		1800	4.1
	2340	1.2			
6 M	0620	4.5	**21** TU	0010	1.6
	1220	2.5		0625	4.6
	1745	4.1		1250	1.7
				1850	4.1
7 TU	0015	1.3	**22** W	0050	1.9
	0645	4.5		0655	4.5
	1255	2.2		1330	1.5
	1830	4.1		1940	4.1
8 W	0050	1.5	**23** TH	0125	2.2
	0715	4.5		0725	4.4
	1335	2.0		1410	1.4
	1920	4.1		2035	4.1
9 TH	0125	1.8	**24** F	0205	2.6
	0740	4.5		0750	4.2
	1415	1.7		1450	1.4
	2015	4.0		2135	4.0
10 F	0205	2.2	**25** SA	0250	2.9
	0815	4.5		0815	4.0
	1500	1.5		1530	1.4
	2120	4.0		2240	4.0
11 SA	0255	2.6	**26** SU	0345	3.2
	0845	4.4		0840	3.8
	1550	1.3		1610	1.5
	2235	4.0		2350	4.0
12 SU	0350	2.9	**27** M	0505	3.3
	0925	4.2		0915	3.7
	1645	1.2		1700	1.5
13 M	0000	4.1	**28** TU	0055	4.1
	0505	3.2		0700	3.3
	1010	4.1		1005	3.5
	1745	1.1		1755	1.6
14 TU	0125	4.2	**29** W	0155	4.2
	0640	3.3		0820	3.2
	1110	3.9		1115	3.4
	1850	1.1		1900	1.7
15 W	0230	4.4	**30** TH	0245	4.2
	0810	3.2		0905	3.0
	1225	3.8		1245	3.3
	2000	1.0		2000	1.6
			31 F	0325	4.3
				0940	2.8
				1410	3.4
				2055	1.6

Data sheet – 1



Answers

Answer – 1 (a)

Track A – Does not comply

Track B – Does not comply

Track C – Complies

Track D – Complies

Need explain the reasons for above

04 marks each

Answer – 1 (b)

1 – Roundabout

2 – Recommended direction of traffic flow

3 – Traffic separation zone

4 – General direction of traffic flow

5 – Outer limits of the TSS

6 – Inshore traffic zone

7 – Precautionary area

02 marks each

Answer – 2(a)

- High environmental pressure
- Low environmental pressure
- Effects of wind
- Negative surges

05 marks

Answer – 2(b)

Max. draught = 11.9 m

UKC = 10 x 11.9 / 100 = 1.19 m = 1.2 m

Total depth required = 11.9 + 1.2 = 13.1 m

Charted depth = 9.5 m

Required draft = 13.1 – 9.5 = 3.6 m

05 marks

1st duration = 0625 hrs
2nd duration = 0615 hrs

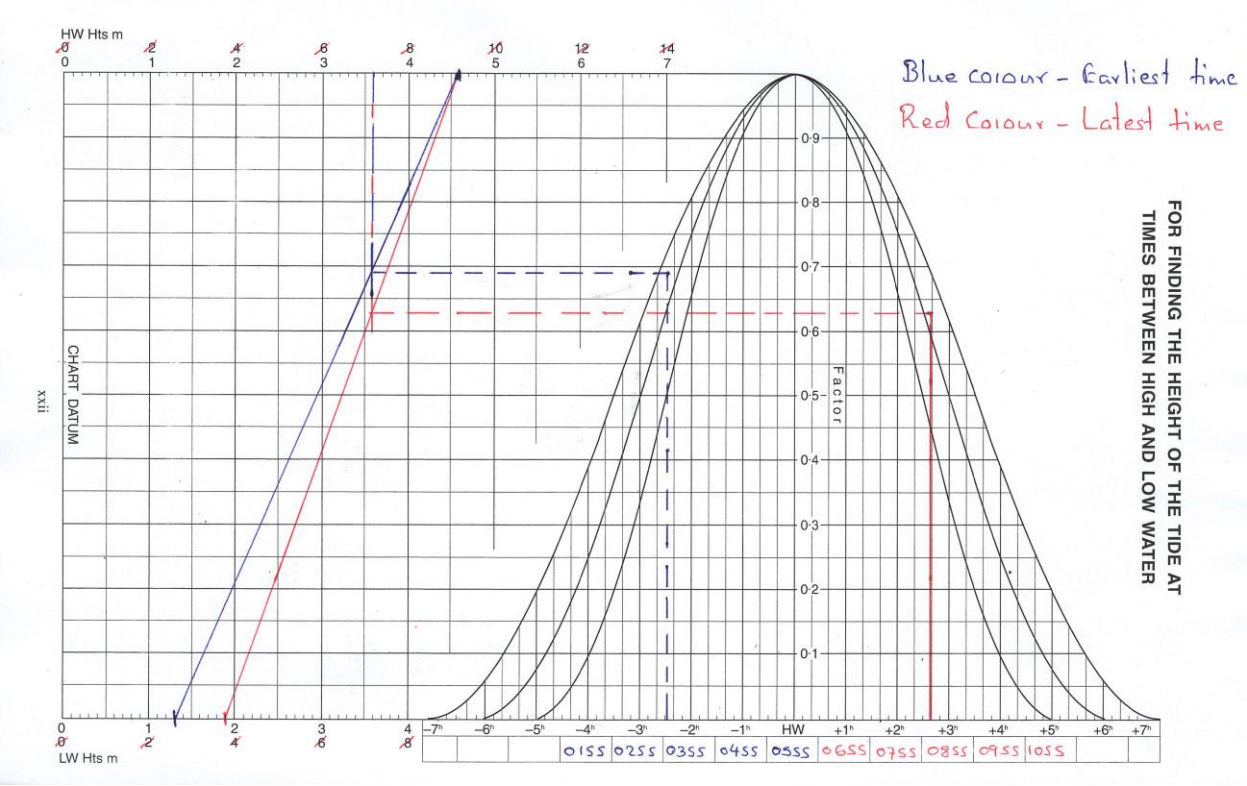
03 marks

Earliest time = 0325 hrs

06 marks

Latest time = 0835 hrs

06 marks



Answer – 3 (a)

- Traffic condition
- Distances to navigation dangers
- Experience of the bridge team members
- Visibility condition
- Manoeuvrability of the vessel
- Condition of the bridge equipment/main engine
- Accuracy of the bridge equipment
- Time of the day (night/day)
- Masters orders
- Company SMS

Answer – 3 (b)

- Main steering gears
- Auxiliary steering gears
- Stern propulsion
- Navigation lights
- Communications between various stations
- Radar
- Gyro repeaters
- Echo sounder
- Course recorder
- Rudder angle indicators around the bridge
- Remote telegraphs

Answer – 3 (c)

- Speed of the vessel
- Scale of the chart
- Distances to navigational dangers
- Company SMS/master's orders
- Traffic density

Answer – 5 (a)

01^0 09.32' N, 103^0 47.72' E

Answer – 5 (b)

On the chart

Answer – 5 (c)

Set - 048^0

Drift – 0.92'

Answer – 5 (d)

068^0