



CINEC CAMPUS (PVT) LTD.
Faculty of Maritime Sciences
Department of Navigation

CERTIFICATE OF COMPETENCY EXAMINATION
OFFICER IN CHARGE OF A NAVIGATIONAL WATCH ON SHIPS OF 500 GT OR MORE (UNLIMITED)
COASTAL NAVIGATION

- Answer all questions
- Total Marks: 180

Date: 01.11.2022

Pass mark: 70%

Time allocated: 03 Hours

1) State the meaning of the following Admiralty Chart Abbreviations/symbols as illustrated in BA 5011:

Question number	Symbol
a)	
b)	
c)	
d)	
e)	

(04 marks each)

- 2) Answer the following questions with regard to **bridge watch keeping** as a duty officer:
- List the factors that need to consider when deciding the watch level at sea. (05 marks)
 - List the factors that need to consider while taking over the watch (10 marks)
 - State the occasions that a OOW may call the master (10 marks)

- 3) Answer the following questions:
- With the aid of diagrams explain how the spring and neap tides occur.
(08 marks)
 - A vessel is expecting to enter port of Dover with a draught of 15 m on 20th of November. The master wants to keep an UKC of one metre throughout. Calculate the earliest time she can enter the port of Dover, if the charted depth is 11 m.
(12 marks)
- 4) Answer the following questions with reference to the Data sheet – 1.
- 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)
 - Identify the symbols 1, 2, 3, 4, 5, 6 and 7 in accordance with the BA 5011.
(14 marks)
- 5) a) At 2245 hrs a vessel observed Awa Saki Pt. Lt. ($35^{\circ} 07.7' N$, $139^{\circ} 37.8' E$) bearing $000^{\circ} (T) \times 2.0'$. She is expecting to proceed to Tokyo after taking Tokyo Bay Pilot. Her engine speed is 16 knts and the draught is 18 m. Plan a passage to Tokyo (arrival position at Tokyo – $35^{\circ} 30.5' N$, $139^{\circ} 50' E$) from the position at 2245 hrs assuming that the vessel is equipped with the required equipment for her size.
(50 marks)- Give your text of the first report to “Tokyo Wan Traffic Advisory Service Centre”.
(05 marks)
- Calculate the ETA at arrival position at Tokyo.
(05 marks)
- Calculate the course to steer between buoy No. 2 ($35^{\circ} 12.7' N$, $139^{\circ} 47.2' E$) and buoy No. 4 ($35^{\circ} 15.4' N$, $139^{\circ} 47.2' E$) if the vessel is experiencing a current with a set of $050^{\circ} (T)$ and a rate of 3 knots.
(15 marks)
- Just after passing the above buoy No. 2, the vessel encounters a steering gear failure and a main engine failure. What are the actions to be taken as a duty officer?
(05 marks)
- On arrival at the arrival position at Tokyo, master dropd the port anchor 6 shackles on deck while the heading was $060^{\circ} (T)$. If the vessel’s length is 232 m, draw the vessel’s swinging circle.
(05 marks)

ENGLAND - DOVER

LAT 51°07'N LONG 1°19'E

TIME ZONE UT(GMT)

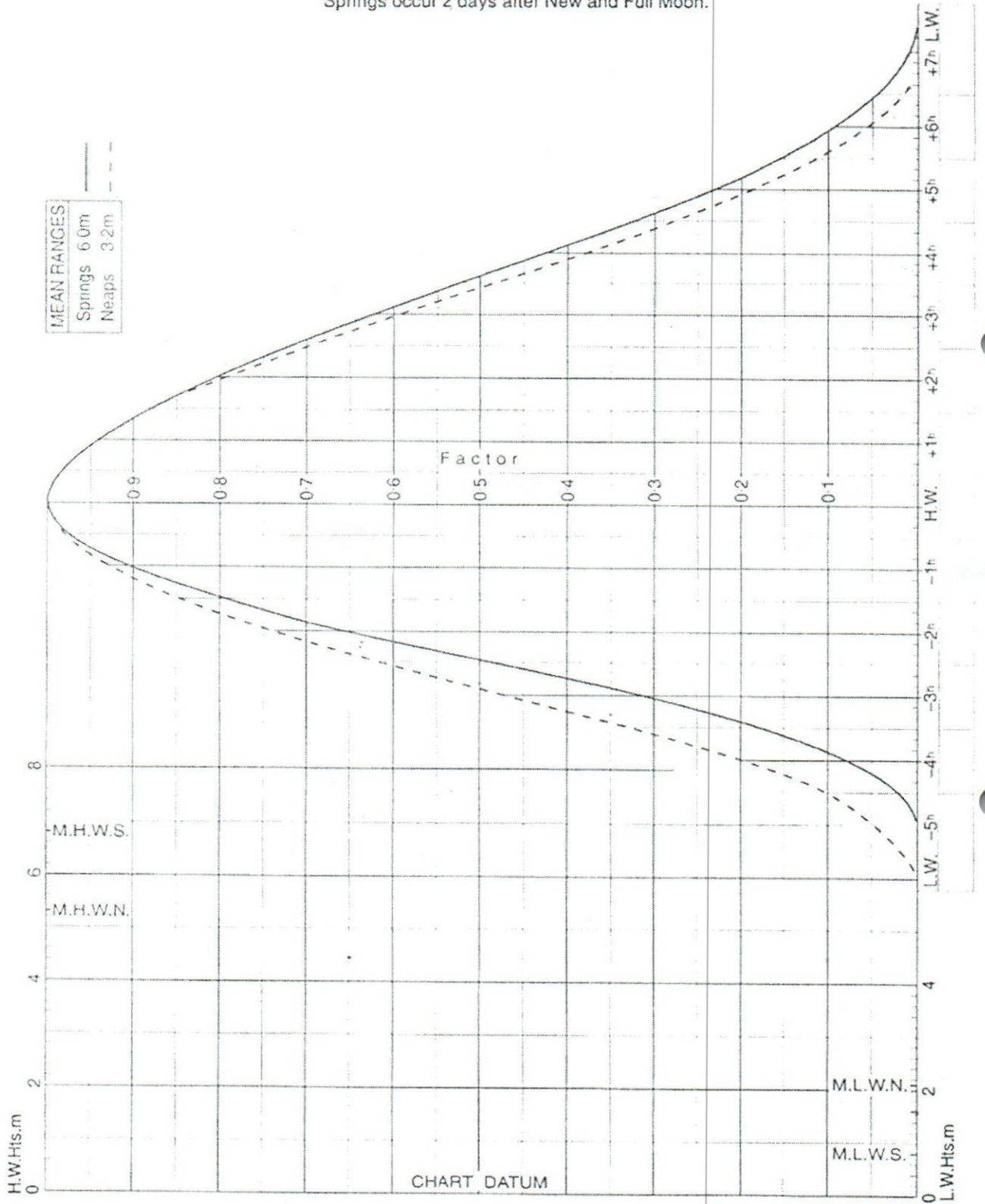
TIMES AND HEIGHTS OF HIGH AND LOW WATERS

YEAR 2000

SEPTEMBER				OCTOBER				NOVEMBER				DECEMBER			
Time	m	Time	m	Time	m	Time	m	Time	m	Time	m	Time	m	Time	m
1 0044	6.8	16 0006	6.5	1 0055	6.7	16 0010	6.8	1 0139	6.4	16 0119	6.7	1 0147	6.2	16 0208	6.6
0822	0.7	0733	1.1	0822	0.9	0743	1.0	0838	1.5	0849	1.1	0846	1.6	0940	1.1
1259	7.0	SA 1223	6.7	SU 1312	6.8	M 1230	6.9	W 1354	6.2	TH 1344	6.5	F 1402	5.9	SA 1439	6.3
2042	0.6	1955	1.0	2041	0.9	2004	1.0	2051	1.6	2110	1.4	2100	1.8	2202	1.4
2 0122	6.7	17 0036	6.5	2 0130	6.5	17 0047	6.8	2 0213	6.1	17 0213	6.4	2 0219	5.9	17 0306	6.3
0856	0.8	0806	1.1	0849	1.2	0819	1.0	0907	1.7	0937	1.4	0924	1.8	1035	1.3
1339	6.9	SU 1255	6.7	M 1348	6.6	TU 1309	6.8	TH 1432	5.8	F 1445	6.2	SA 1442	5.6	SU 1545	6.0
2156	0.7	2027	1.0	2107	1.2	2039	1.1	2123	1.9	2201	1.7	2141	2.0	2258	1.6
3 0201	6.5	18 0108	6.6	3 0207	6.3	18 0128	6.6	3 0254	5.7	18 0319	6.1	3 0302	5.7	18 0408	6.1
0927	1.0	0839	1.1	0913	1.4	0857	1.2	0944	2.0	1036	1.7	1010	2.1	1134	1.5
1450	5.6	M 1458	6.7	TU 1426	6.3	W 1452	6.5	F 1528	5.8	SA 1503	5.8	SU 1543	5.3	M 1655	5.8
2148	1.0	2100	1.1	2130	1.5	2118	1.4	2204	2.2	2306	2.0	2229	2.2		
4 0242	6.2	19 0145	6.5	4 0248	6.0	19 0216	6.3	4 0401	5.4	19 0435	5.8	4 0406	5.4	19 0000	1.8
0955	1.4	0914	1.3	0939	1.8	0941	1.5	1034	2.3	1149	1.9	1107	2.2	0516	5.9
1601	6.3	TU 1410	6.5	W 1510	5.9	TH 1446	6.1	SA 1643	5.2	SU 1728	5.6	M 1702	5.2	TU 1238	1.6
2218	1.4	2135	1.4	2158	1.9	2205	1.7	2300	2.5			2331	2.1	1810	5.8
5 0327	5.9	20 0230	6.2	5 0340	5.6	20 0320	5.9	5 0518	5.2	20 0027	2.1	5 0525	5.3	20 0106	1.9
1020	1.7	0954	1.5	1015	2.1	1036	1.9	1151	2.5	0556	5.7	1223	2.3	0631	5.8
1640	5.9	W 1458	6.2	TH 1609	5.4	F 1606	5.7	SU 1757	5.1	M 1308	1.0	TU 1813	5.2	W 1543	1.8
2252	1.8	2220	1.7	2240	2.3	2308	2.1			1851	5.6	1921	5.5		
6 0422	5.5	21 0326	5.8	6 0449	5.3	21 0453	5.5	6 0640	2.6	21 0148	2.0	6 0656	2.4	21 0214	1.9
1105	2.1	1046	1.9	1109	2.5	1153	2.1	0630	5.3	0716	5.8	0633	5.5	0741	5.9
1647	5.5	TH 1606	5.8	F 1722	5.1	SA 1746	5.5	M 1329	2.4	TU 1423	1.6	W 1330	2.1	TH 1449	1.8
2242	2.2	2320	2.1	2354	2.6			1906	5.3	2001	5.8	1912	5.5	2021	5.8
7 0629	5.1	22 0529	5.4	7 0604	5.1	22 0642	2.3	7 0285	2.4	22 0302	1.8	7 0209	2.1	22 0321	1.8
1213	2.1	1119	2.2	1256	2.6	0626	5.5	0732	5.5	0819	6.1	0729	5.7	0840	6.0
1758	5.2	1757	5.5	SA 1839	5.1	SU 1326	2.1	TU 1435	2.1	W 1534	1.4	TH 1440	1.8	F 1555	1.5
						1914	5.6	2002	5.6	2057	6.1	2002	5.8	2112	6.0
8 0103	2.5	23 0051	2.2	8 0142	2.6	23 0215	2.1	8 0304	2.0	23 0405	1.5	8 0308	1.8	23 0422	1.6
0644	5.2	0645	5.4	0719	5.3	0745	5.8	0820	5.9	0910	6.4	0817	6.1	0930	6.2
1048	5.9	SA 1336	2.1	SU 1422	2.4	M 1450	1.7	W 1529	1.7	TH 1634	1.1	F 1536	1.5	SA 1650	1.4
1612	5.1	1924	5.6	1955	5.3	2027	5.9	2045	5.9	2142	6.3	2046	6.1	2156	6.1
9 0822	5.4	24 0227	2.0	9 0253	2.2	24 0334	1.7	9 0354	1.7	24 0457	1.3	9 0402	1.5	24 0511	1.4
0800	1.4	0802	5.7	0821	5.6	0847	6.2	0900	6.2	0954	6.6	0901	6.4	1014	6.3
1401	2.9	SU 1501	1.8	M 1524	1.9	TU 1602	1.3	TH 1617	1.4	F 1723	1.0	SA 1628	1.2	SU 1734	1.3
2040	2.1	2038	6.0	2050	5.7	2123	6.3	2123	6.3	2220	6.5	2127	6.4	2235	6.3
10 0029	2.0	25 0348	1.6	10 0348	1.8	25 0436	1.3	10 0440	1.4	25 0541	1.1	10 0452	1.3	25 0552	1.3
0900	5.7	0905	6.2	0906	6.0	0936	6.5	0937	6.5	1034	6.7	0943	6.7	1053	6.4
1601	1.8	M 1617	1.3	TU 1613	1.6	W 1701	0.9	F 1702	1.1	SA 1803	1.0	SU 1719	1.0	M 1810	1.3
2152	5.8	2138	6.3	2127	6.0	2208	6.6	2159	6.5	2256	6.6	2209	6.6	2313	6.4
11 0421	1.7	26 0456	1.2	11 0434	1.5	26 0527	1.0	11 0523	1.2	26 0618	1.1	11 0540	1.0	26 0628	1.3
0943	6.0	0955	6.6	0941	6.3	1018	6.8	1013	6.7	1111	6.7	1027	6.8	1130	6.4
1640	1.5	TU 1720	0.9	W 1656	1.3	TH 1750	0.7	SA 1746	1.0	SU 1838	1.0	M 1806	0.9	TU 1841	1.3
2036	6.0	2226	6.6	2200	6.3	2246	6.7	O 2234	6.7	2331	6.6	O 2252	6.8	2349	6.5
12 0506	1.4	27 0550	0.9	12 0515	1.3	27 0610	0.9	12 0604	1.0	27 0652	1.1	12 0626	0.9	27 0659	1.3
1010	8.3	1039	6.9	1014	6.5	1056	6.9	1051	6.9	1148	6.7	1111	6.9	1205	6.4
1730	1.3	W 1813	0.6	TH 1737	1.1	F 1832	0.7	SU 1828	0.9	M 1907	1.1	TU 1852	0.8	W 1910	1.3
2036	6.3	2308	6.8	2235	6.5	2320	6.8	2311	6.8			2337	6.9		
13 0845	1.3	28 0637	0.8	13 0554	1.1	28 0648	0.9	13 0645	0.9	28 0007	6.6	13 0713	0.8	28 0024	6.5
1040	6.5	1119	7.0	1047	6.7	1134	6.9	1129	7.0	0720	1.2	1158	6.9	0729	1.3
1807	1.1	TH 1858	0.5	F 1816	1.0	SA 1908	0.8	M 1908	0.9	TU 1224	6.5	W 1937	0.9	TH 1239	6.3
2006	6.4	2344	6.9	O 2305	6.6	2354	6.8	2350	6.9	1933	1.3			1939	1.4
14 0902	1.2	29 0718	0.7	14 0632	1.0	29 0720	1.0	14 0725	0.9	29 0042	6.5	14 0024	6.9	29 0057	6.4
1121	6.6	1157	7.1	1121	6.8	1210	6.9	1210	6.9	0747	1.3	0759	0.8	0759	1.4
1844	1.0	F 1938	0.5	SA 1854	0.9	SU 1939	0.9	TU 1947	0.9	W 1257	6.4	TH 1247	6.8	F 1310	6.1
2037	6.5			2337	6.7					1958	1.4	2023	1.0	2010	1.4
15 0958	1.1	30 0019	6.8	15 0708	1.0	30 0028	6.7	15 0032	6.8	30 0116	6.4	15 0114	6.8	30 0126	6.3
1162	6.7	0752	0.8	1155	6.9	0749	1.1	0805	1.0	0814	1.5	0849	0.9	0833	1.4
1820	1.0	SA 1235	7.0	SU 1930	0.9	M 1246	6.7	W 1254	6.8	TH 1330	6.1	F 1340	6.6	SA 1339	6.0
		2011	0.7			2005	1.1	2026	1.1	2026	1.6	2111	1.2	2045	1.5
				31 0103	6.6									31 0154	6.2
				0814	1.3									0910	1.6
				TU 1320	6.5									SU 1409	5.8
				2027	1.3									2122	1.7

DOVER

MEAN SPRING AND NEAP CURVES
Springs occur 2 days after New and Full Moon.



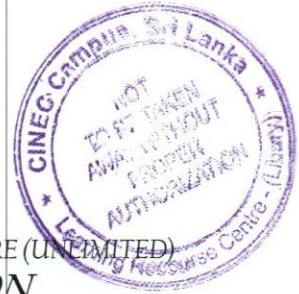


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CERTIFICATE OF COMPETENCY EXAMINATION

OFFICER IN CHARGE OF A NAVIGATIONAL WATCH ON SHIPS OF 500 GT OR MORE (UNLIMITED)

OCEAN AND OFFSHORE NAVIGATION



- Answer all questions.
- Formulae & all intermediate steps taken in reaching your answer should be clearly shown.
- Total Marks: 200

Date: 03.11.2022

Pass mark 70%

Time allocated: 03 Hours

1. A vessel in position $40^{\circ} 50' N$, $050^{\circ} 00' W$ has to proceed to position $43^{\circ} 00' N$, $015^{\circ} 00' W$ by a great circle track. Find the following;
 - a) Great Circle distance
 - b) Initial course
 - c) Final course

(40 marks)

2. Find by Mercator's Principle the course and distance from starting position $14^{\circ} 00' S$, $172^{\circ} 00' W$ to $17^{\circ} 30' N$, $149^{\circ} 30' W$.

(25 marks)

3. On 22nd September 1992, PM ship in DR $40^{\circ} 36' S$ $140^{\circ} 48' W$, the sextant altitude of Saturn was $54^{\circ} 56.2'$ at 04h 14m 36s chronometer time (error 06m 30s fast). If IE was $3.0'$ on the arc and HE was 20m, find,
 - a) The longitude where it crosses the DR lat.
 - b) The direction of the Position Line (PL)
 - c) The position through which to draw the PL

(35 marks)

4. On 22nd September 1992, AM at ship in DR $10^{\circ} 02' S$, $076^{\circ} 50' E$, the sextant altitude of the Moon's LL was $44^{\circ} 31.7'$ when the chronometer showed 00h 17m 21s (error 07m 28s slow). If IE was $0.6'$ on the arc and HE was 14m, find by intercept method the direction of the PL and a position through which to draw it.

(35 marks)

5. On 1st Dec 1992, AM at ship in DR $47^{\circ} 24' N$ $143^{\circ} 18' E$, the sextant altitude of the Polestar was $46^{\circ} 50.4'$ at 08h 50m 10s chronometer time (error 05m 52s slow). If IE was $2.0'$ off the arc and HE was 16m, find the direction of the Position Line (PL) and a position through which it passes.

(25 marks)

6. a) On 12th Sept 1992, in DR $43^{\circ} 12' S$ $072^{\circ} 18' E$, the sextant meridian altitude of the star ALDEBARAN was $30^{\circ} 28.4'$. If IE was $1.2'$ off the arc and HE was $17m$, find the latitude and direction of the PL.

(20 marks)

- b) On 1st May 1992, in DR $30^{\circ} 12' N$, $179^{\circ} 36' W$, the Sun set bore $287^{\circ} (C)$. If variation was $3^{\circ} W$, find the deviation of the compass.

(20 marks)



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CERTIFICATE OF COMPETENCY EXAMINATION

OFFICER IN CHARGE OF A NAVIGATIONAL WATCH ON SHIPS OF 500 GT OR MORE (UNLIMITED)

OPERATIONAL SAFETY

- Answer all questions
- Total Marks: 180

Date: 02.11.2022

Pass mark: 60%

Time allocated: 03 Hours

1) Explain following definitions:

- Measurement cargoes
- Cargo sweat
- Ship sweat
- Load density
- Lower Flammable Limit
- Rigged to disadvantage

(5 Marks)

each)

2) Answer the following question in relation to the cargo operation and cargo care:

a) Temperature regulated cargoes are more susceptible for variations in temperatures in the stowage atmosphere. Explain in detail with a suitable diagram the principal of cargo refrigeration plant.

(10 marks)

b) Ventilation is a process of exchanging or replacing air in a compartment according to desired requirements. Briefly explain purpose of ventilation onboard a cargo vessel.

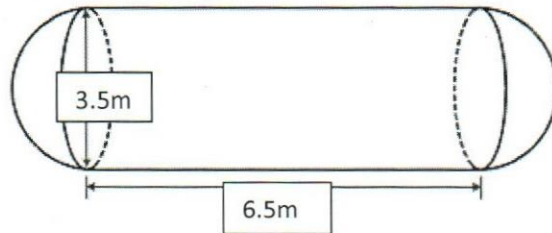
(10 marks)

c) Carriage of cargoes on merchant vessels are associate with many hazards. In relation to deck cargoes briefly explain hazards associate with deck cargoes.

(10 marks)

3)

- a) A tank with following dimensions has to load with oil of RD 0.91. find the mass of oil that can be loaded allowing 8% of the volume of oil for expansion. (Use following formula to find the volume of sphere – $(4 \times \pi \times r^3)/3$)



(10 marks)

- b) Briefly describe
- Oil Record Book
 - Garbage Management Plan

(5 Marks)

each)

- c) Globally many countries are having their own local ballast water regulations and requirements. Compliance of vessels calling to these ports being checked by sampling and records maintained in relation to ballast operations. Briefly explain what documents the vessel should have onboard in relation to Ballast Water Management.

(10 Marks)

4)

- a) How do you grade the marine pollutants and explain the ways and means of identifying same once a package is placed on board?

(10 marks)

- b) What do you understand by the following columns in the dangerous good list?
- Subsidiary Risk
 - Emergency Schedules

(12 marks)

- c) The treatment of casualties should be done symptomatically. What does this statement mean to you and what difference does it make compared with the previous practice?

(08 marks)

5)

a) Crude oil tankers are fitted with Inert Gas system which minimize the explosion hazards while transporting the crude oil. Briefly describe benefits of Inert Gas system.

(10 Marks)

b) Inert Gas system provides certain advantage and disadvantages briefly explain advantages and disadvantages of the Inert Gas system.

(20 Marks)

6) With reference to IMSBC code,

a) Explain the following.

- i) Angle of Repose
- ii) Transportable Moisture Limit
- iii) Flow moisture point
- iv) Moisture migration

(5 Marks each)

b) What are the information that you seek from the shipper before accepting a shipment under this code?

(10 Marks)



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CERTIFICATE OF COMPETENCY EXAMINATION
 OFFICER IN CHARGE OF A NAVIGATIONAL WATCH ON SHIPS OF 500 GT OR MORE (UNLIMITED)
PRINCIPLES OF NAVIGATION

- Answer any six (06) questions.
- Formulae & all intermediate steps taken in reaching your answer should be clearly shown.
- Total marks: 120

Date: 04.11.2022

Pass mark: 70%

Time allocated: 03 Hours

1. With the aid of diagrams explain the following;

a) i) GHA ii) SHA iii) Declination iv) Geographical Position (08 marks)

b) With the aid of diagrams derive the followings;
 i) $LHA^* = GHA\gamma + SHA^* + Long (E)$
 ii) $LHA^* = GHA\gamma + SHA^* - Long (W)$ (06 marks)

c) Calculate the LHA of a star whose RA is 74° , for an observer in longitude $40^\circ E$, when GHA γ is 205° . (06 marks)

2. a) Why does the duration of the Moon's Synodic Period is longer than Sidereal Period (06 marks)

b) With the aid of a sketch describe Lunar Eclipse. (06 marks)

c) Describe with a diagram the phases of the Moon. (08 marks)

3. a) Explain how to find equation of time from Nautical Almanac with a suitable example. (06 marks)

b) Find the equation of time at 1400 hrs GMT, when the GHA of the Sun was $31^\circ 00'$. (08 marks)

c) Describe the following;
 i) Sidereal Year ii) Tropical Year (06 marks)

4. a) Explain the Kepler's three laws of planetary motion
(10 marks)
- b) Describe the difference of Inferior and Superior Conjunctions
(05 marks)
- c) With the aid of a diagram explain the Apparent Motion of planet "Jupiter".
(05 marks)
5. a) Describe the following;
i) Civil Twilight
ii) Nautical Twilight
iii) Astronomical Twilight
(09 marks)
- b) What condition must be satisfied for Twilight to last all night?
(06 marks)
- c) Explain the reason why Twilight last longer in higher latitudes.
(05 marks)
6. a) Describe the following with suitable diagrams.
i) Elongation
ii) Conjunction
iii) Opposition
iv) Quadrature
(12 marks)
- b) Sketch and describe the arcs of great circles of PZX Spherical triangle.
(08 marks)
7. a) Explain the following;
i. Parallel Sailing
ii. Departure between two positions
(10 marks)
- b) What is the Parallel Sailing Formula?
(04 marks)
- c) Derive the Parallel Sailing Formula.
(06 marks)