



PAST PAPERS

<i>Faculty</i>	<i>Department / Section/Division</i>
<i>Not Applicable</i>	<i>Learning Resource Centre</i>

Past Papers

Faculty of maritime Science
Department of Navigation

**Navigation Class IV
(Ministry)
1999-2022**

<i>Document Control & Approving Authority</i>	<i>Senior Director – Quality Management & Administration</i>
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**DIRECTORATE OF MERCHANT SHIPPING
GOVERNMENT OF SRI LANKA**

CERTIFICATE OF COMPETENCY EXAMINATION
GRADE.: OFFICER IN CHARGE OF A NAVIGATIONAL WATCH ON
SHIPS OF (i)500 GT OR MORE

(ii)LESS THAN 3000 GT ON NCV

SUBJECT : OPERATIONAL SAFETY

DATE : 28th December 2007, 0900hrs to 1200hrs.

Time allowed THREE hours

Total Marks 180

Answer ALL questions

Pass Marks 60%

Formulae and all intermediate steps taken in reaching your answer should be clearly shown . You may draw sketches wherever considered necessary .

(1)With regard to the IMDG Code ,

(a)The "Blue Books" were available for usage and guidance since 1969. But it was only recommendatory over three decades . The revised version came into be mandatory for compliance since 01st January 2004 . How this was achieved ?

(10 Marks)

(b)On a single package of hazardous material placed on board for carriage you find two "Classes" of labels pasted with same prominence. What does this mean to you?

(10 Marks)

(c)Apart from the labels mentioned in the above (b) how do you identify whether that Commodity is a mild / medium / severe Marine Pollutant ?
How indications to that effect is shown on the package ?

(10 Marks)

(2)(i)Sketch and explain how a " Three Fold purchase " could be used for ,

(a)Advantage

(b)Disadvantage

(05 Marks each)

(ii)A three fold purchase rigged to disadvantage is utilized for lifting a weight of 24 tonnes

Calculate the minimum size of the steel wire rope of 6 x 24 strands construction that should be used in the purchase to handle the load safely . Consider the factor of safety to be five and allow 12% load per sheave lost on friction . The rig could be considered weightless

(20 Marks)

Contd...../ 02



- (3)(a) Translocation of sea water through ships' Ballast water has grown into a sizable proportion where it has threatened the environmental balance thus causing harm to ecosystems and biodiversity at some areas. Analyze this statement giving examples.
(10 Marks)
- (b) What methodology has been proposed to minimize / eliminate the adverse effects of such invasive migrant species ?
(10 Marks)
- (c) Propose what records you would suggest to maintain with regard to ballast water management and related operations .
(10 Marks)
- (4) Write short notes on the following ,
(a) Load Line Convention
(b) FAL Convention
(c) ISPS Code
(d) Globallast Programme
(e) BIMMS Conference
(f) Articles of Agreement
(05 Marks each)
- (5)(a) Discuss how the objectives of the ISM Code is achieved ,
(i) On board the vessel .
(ii) At shore based management .
(15 Marks)
- (b) Propose an emergency Muster list for a boiler explosion in the machinery space . Explain the various duties you would entrust on the individuals to handle the eventualities .
(15 Marks)
- (6)(a) Availability of an Inert Gas system on board a Crude Oil carrier ensures safe operation. Sketch and explain how this is achieved .
(18 Marks)
- (b) In choosing the kind of Inert Gas what factors should be considered ?
(06 Marks)
- (c) Explain the advantages of having an Inert Gas system on board a tanker over any other system .
(06 Marks)

(22)

DIRECTORATE OF MERCHANT SHIPPING
GOVERNMENT OF SRI LANKA

CERTIFICATE OF COMPETENCY EXAMINATION
GRADE : OFFICER IN CHARGE OF A NAVIGATIONAL WATCH
ON SHIPS OF (i) 500 GT OR MORE
(ii) LESS THAN 3000 GT ON NCV

SUBJECT : OPERATIONAL SAFETY

DATE : 27th September 2007 , 0900hrs to 1200hrs.

Time allowed THREE hours.

Total Marks 180

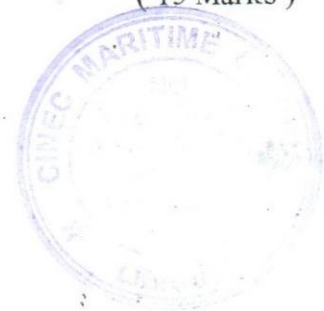
Answer ALL questions.

Pass Marks 60 %

Formulae and all intermediate steps taken in reaching your answer should be clearly shown . You may draw sketches where ever required .

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- (1) With regard to tanker operations ,
- (a) Explain the safety standards achieved by introducing Inert Gases into the cargo tanks . Compare the improvements in efficiency against the conventional methods. (15 Marks)
- (b) Sketch and explain an Inert Gas system on board a crude oil carrier . (15 Marks)
- (2)(a) Sketch and explain how a "Gun Tackle " is used ,
- (i) To advantage
- (ii) To Disadvantage (05 Marks each)
- (b) A two fold purchase rigged to advantage is used to lift a weight of ten tonnes . Calculate the minimum size of the steel wire rope of 6 x 37 strands construction that should be used in the rig to handle the shipment safely . Consider the factor of safety to be 5 and allow 08% load per sheave for friction . The rig is weightless . (20 Marks)
- (3) With regard to the new IMDG Code ,
- (a) The IMDG Code has existed since three decades . It was only recommendatory all these years . It could be made mandatory only from 01st January 2004 . How and why ? (15 Marks)
- (b) Explain what information is contained in the following columns in the Dangerous goods list ,
- (i) Limited quantities (ii) Subsidiary Risk (15 Marks)

Contd.... / 02



(4) Write short notes on the following .

- (i) FAL Convention
- (ii) Civil Liability Convention
- (iii) UNCLOS
- (iv) SOLAS Convention
- (v) MARPOL Convention and Protocols
- (vi) STCW 1978 as amended 1995

(05 Marks each)

(5)(a) Your vessel has to carry a cargo of Desiccated Coconut from Colombo to Hamburg (Germany) in the month of March . The cargo is packed into 50 kg. bags made of natural recyclable paper . Discuss how the weather would act on the cargo en-route if no ventilation was done. (10 Marks)

(b) Explain the methods of ventilation you would adopt to preserve the cargo

- (i) If the vessel can provide Natural Ventilation .
- (ii) If the vessel can provide Mechanical Ventilation .

(15 Marks)

(6)(a) What are the objectives of ISPS Code and discuss how these are achieved ,

- (i) On board a vessel
- (ii) Ashore in a port management

(15 Marks)

(b) Draw up a Security Check list for a multipurpose cargo vessel for departing from a seaport. What difference does it make when compared with the ISM procedures ?

(15 Marks)

DIRECTORATE OF MERCHANT SHIPPING GOVERNMENT OF SRI LANKA

CERTIFICATE OF COMPETENCY EXAMINATION

GRADE : MASTER ON SHIPS OF LESS THAN 500 GT (NCV)

SUBJECT : COASTAL NAVIGATION.

DATE : 09th April 2007

Time allowed THREE hours

Answer ALL questions

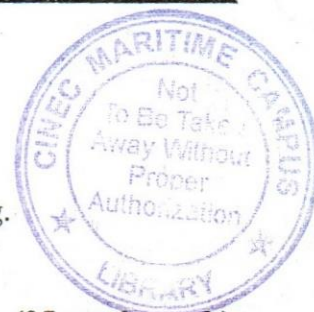
Formulas and intermediate steps taken in reaching your answer should be clearly shown.
Use Deviation card no I and variation as given in the chart. Positions in the chart given for your guidance only.

Total Marks 150

Pass Marks 70%

(1) Sketch/Write and show the chart symbols for the following ,

- i) Established direction of traffic flow.
- ii) Doubtful depth of 22 m.
- iii) An underwater obstruction with the depth known by wire drag.
- iv) Precautionary area.
- v) Nature of sea bed Sand and Mud.



(05 marks each)

(2) Find the earliest time on 23rd May 1998 to cross a bar at Cochin, with a draft of 3.8 m. Vessel is required to have an under keel clearance of 0.8m at the bar for safe passing, which has a charted depth of 4.0m. *0.7 51 Hrs*

(25 marks)

(3) You are in a General cargo vessel, anchored 5 miles due East of Sangamakanda Pt and intending to proceed to Colombo Harbour for loading. Her draft is 4.5 m and can maintain an average speed of 10 kts,

(i) Plan the intending passage and illustrate it on the chart provided, with all the standard information.

You shall comply all international and local traffic regulations.

(25 Marks)

(ii) If you departed at 1000hrs 27th April, find the ETA Colombo pilot boarding grounds.

(10 Marks)

(iii) Evaluate the methods adaptable for position fixing en-route

(10 Marks)

(4) At 0900hrs, while steering a course of 225° (T) at a speed of 12 kts, Little Basses Lt (06° 24'.4 N; 081° 43'.8 E) bore 320° (T). At 1000hrs the same Light bore 025°(T). If the ship was experiencing a current of 185° (T) at 2.5kts throughout, Find the following.

(i) Position of the vessel at 1000hrs. *06° 18' N* *081° 51' 4 E* (10 Marks)

(ii) Course and speed made good by the vessel. *219° T* *14.7 kn* *220° T* *14.7 kn* (10 Marks)

(iii) From 1000 position, set compass course to pass Hambantota Pt. (06° 07'.4 N; 081° 07'.8 E) 10miles abeam to starboard if same conditions prevail. (10 Marks)

Variation = 2.8W *7 COM* *294 (T)*
Dev = 11.4E *286.4 (C)*
Error = 7.6E

(5) At 0800 hrs on 14th May 1999, a vessel observed the following horizontal sextant angles;
Between Dondra Head Lt (05° 55'.3 N; 080° 35'.5 E) and Weligama Lt (05° 58'.0 N; 080° 25'.3 E) - 035°.
Between Weligama Lt (05° 58'.0 N; 080° 25'.3 E) and Point De Galle Lt (06° 01'.5 N; 080° 13'.0 E) - 057°
Find the position of the vessel at the time of observation. (25 Marks)

35
90
90 S
35
55
90
57
33

250 *252* *260* *252*
252 *260* *252*
250L - 25W = 177.5
260 - 25W = 150
14th 0800 - position *05° 41' N*
80 22 E



18 12

DIRECTORATE OF MERCHANT SHIPPING GOVERNMENT OF SRI LANKA

CERTIFICATE OF COMPETENCY EXAMINATION

GRADE : OFFICER INCHARGE OF A NAVIGATIONAL WATCH
ON SHIPS OF (i) 500 GT OR MORE (UNLIMITED)
(ii) LESS THAN 3000 GT (NCV)



SUBJECT : COASTAL NAVIGATION.

DATE : 20th December 2006

Time allowed THREE hours

Total Marks 150

Answer ALL questions

Pass Marks 70%

Formulas and intermediate steps taken in reaching your answer should be clearly shown. Use Deviation card no I and variation as given in the chart. Positions in the chart given for your guidance only.

(01) a. A vessel observed following Compass bearings;

- Pendeen Lt (Lat. $50^{\circ} 10.0' N$; Long. $005^{\circ} 40' 0 W$) - $120^{\circ} (C)$
- Seven Stones Lt (Lat. $50^{\circ} 03.5' N$; Long. $006^{\circ} 04' 5 W$) - $158^{\circ} (C)$
- Round Island Lt (Lat. $49^{\circ} 58.8' N$; Long. $006^{\circ} 19' 0 W$) - $185^{\circ} (C)$

Find the error of the ship's compass. $1^{\circ} E$

(10 marks)

b. A vessel in position Lat. $49^{\circ} 55.0' N$; Long. $006^{\circ} 00' 0 W$, steering on a course of $222^{\circ} (T)$ intends to alter the course to $270^{\circ} (T)$ when Bishop Rock Lt (Lat. $49^{\circ} 57.2' N$; Long. $006^{\circ} 26' 5 W$) brg $315^{\circ} (T)$ x $11.5'$. The next alteration is to a course of $323^{\circ} (T)$ when the same Lt brg $036^{\circ} (T)$ x $10.0'$. With the aid of the Radar plotting sheet provided, illustrate how you use the parallel index technique to maintain the vessel on the intended track during the alterations.

(10 marks)

(02) A vessel is berthed at River Tyne (Northshields) alongside a quay with a drying height of 0.5 m. Find the time when the vessel will take the ground on the falling PM tide on 20th January 1999 if the vessel's draft is 4.0 m.

(25 marks)

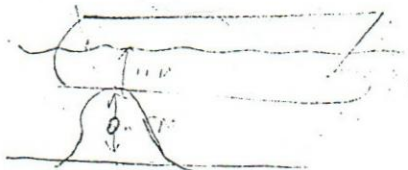
20TH JAN

0504 - 4.9

1111 1.0

1709 5.1

2341 10.7



Handwritten notes: "0.5m Drying Height", "4.0m Draft", "10.25m"

(03) Your vessel departed 15' South of Creach Lt (Lat. $48^{\circ} 27.3' N$; Long. $005^{\circ} 008'.0 W$) to Le Havre Pilot boarding ground (Lat. $49^{\circ} 30'.0 N$; Long. $000^{\circ} 02'.0 W$) at 0600 hrs on 19th February 1999. Vessel is fitted with all required navigational equipments and placed at your disposal. Vessel drew 7 meters and could make 17 knots.

(i) Plan the intended passage and clearly plot the courses and the way points en route.

(20 marks)

(ii) Evaluate the currents (rate and direction) you expect to encounter during the passage from the available data.

(10 marks)

(iii) Justify giving reasons for choosing your track and indicate the navigational aids and methods you would utilize for position fixing.

(10 marks)

(iv) Calculate the ETA at Le Havre Pilot boarding ground disregarding the external forces.

(05 marks)

(04) At 0800 hrs on 15th July 1999, a navigator made the following horizontal sextant angles;

Between Bill of Portland ($50^{\circ} 31'.0 N$; $002^{\circ} 27'.0 W$) and Anvil Point ($50^{\circ} 35'.7 N$; $001^{\circ} 57'.0 W$) 065° .

Between Anvil Point ($50^{\circ} 35'.7 N$; $001^{\circ} 57'.0 W$) and the Needles Lt ($50^{\circ} 40'.0 N$; $001^{\circ} 35'.5 W$) 055°

The vessel intends to pass Start Point Light ($50^{\circ} 14'.0 N$; $003^{\circ} 38'.0 W$) 15 miles off on the starboard side while counteracting a current of 3 knots setting 220° . Ship is steaming at 16 Knots.

Required to obtain the following,

(i) Position of the vessel at 0800 hours $50^{\circ} 26.5' N$, $001^{\circ} 54' E$ (12 marks)

(ii) Compass course to steer to pass the Start Point Light as intended. 233.3° (10 marks)

(iii) Time of Start Point Light coming abeam on the starboard side. $D = 67.2$ speed = 18.5 knots, $3^h 38^m 15^s$ (08 marks)

(05) A vessel steering on a course of 257° (G) at 15 knots observed Catherine's point Light ($50^{\circ} 34'.5 N$; $001^{\circ} 18'.0 W$) to bear 342° (G) at 1600 hrs. One hour later, the same light bore 038° (G). A tidal stream was setting in the direction of 205° at 4 knots throughout. Wind direction N and leeway is 2° . The Gyro was known to be 2°

(H). Find the following;

(i) Position of the vessel at 1600 hours. 257.7° , 255° , 342° , 205° (10 marks)

(ii) Course and speed made good. 241.3° , 12.7 (10 Marks)

(iii) From 1700 position, set course to pass Channel Lt vessel ($49^{\circ} 54'.5 N$; $002^{\circ} 53'.5 W$) 5.0 miles abeam to port if same conditions prevail. (10 Marks)



90
63
90
C: 217.7
D: 13.05
M: 264.7
V: 3.7
T: 257.0

S
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DIRECTORATE OF MERCHANT SHIPPING
GOVERNMENT OF SRI LANKA

CERTIFICATE OF COMPETENCY EXAMINATION

GRADE : OFFICER INCHARGE OF A NAVIGATIONAL WATCH
ON SHIPS OF (i) 500 GT OR MORE (UNLIMITED)
(ii) LESS THAN 3000 GT (NCV)

SUBJECT : COASTAL NAVIGATION.

DATE : 19th September 2006

R

Time allowed THREE hours
Answer ALL questions
Formulas and intermediate steps taken in reaching your answer should be clearly shown.
Use Deviation card no 1 and variation as given in the chart. Positions in the chart given for your guidance only.

Total Marks 150
Pass Marks 70%

- (01) a. Describe the followings;
 - (i) Temporary Correction
 - (ii) Preliminary Correction.

(04 marks each)
- b. Describe the procedure of correcting the Navigational Charts. This should include the publications to be referred, correcting of charts and recording of the corrections.
(12 marks)
- (02) Find the height of a light house near Avonmouth, above the water surface, at 0800 G.M.T. on 11th January 1999, if the charted height of the light is 48 meters.
S.L.M. 48m (25 marks)
- (03) Your vessel departed from Parsons Bank (Lat. 48° 26.0' N; Long. 006° 32'.0W) to Antifer (Lat. 49° 40'.0 N; Long. 000° 08'.0 E) at 0600 hrs on 26th September 1999. Vessel is fitted with all required navigational equipments and placed at your disposal. Vessel drew 9 meters and could make 15 knots.
 - (i) Plan the intended passage and clearly plot the courses and the way points en route.
(20 marks)
 - (ii) Evaluate the currents (rate and direction) you expect to encounter during the passage from the available data.
(10 marks)
 - (iii) Justify giving reasons for choosing your track and indicate the navigational aids and methods you would utilize for position fixing.
(10 marks)
 - (iv) Calculate the ETA at Antifer disregarding the external forces.
(05 marks)

04) At 1200 hrs on 13th January 1999, a navigator made an observation of horizontal sextant angle of 90° between Wolf Rock ($49^{\circ} 56'.5$ N; $005^{\circ} 49'.0$ W) and Lizard Point ($49^{\circ} 58'.0$ N; $005^{\circ} 12'.0$ E). Lizard Head Light bore 052° (G) at the same time. The vessel intends to pass Eddystone Rocks Light ($50^{\circ} 11'.0$ N; $004^{\circ} 16'.0$ W) 10.0 miles off on the port side while counteracting a current of 1 knots setting 045° (T). Ship is steaming at 18 Knots. Required to obtain the following:

- (i) Position of the vessel at 1200 hours. (08 marks)
- (ii) Compass course to steer to pass the Eddystone Light as intended. (15 marks)
- (iii) Time of Eddystone Rocks Light coming abeam on the port side. (07 marks)

$49^{\circ} 57' 25''$
 $005^{\circ} 30' 30''$
 052°
 045°
 18

(05) A vessel steering on a course of 062° (G) at 18 knots observed Eddystone Rocks Light ($50^{\circ} 11'.0$ N; $004^{\circ} 16'.0$ W) to bear 315° (G) at 1800 hrs. One hour later, the same light bore 291° (G). A tidal stream was setting in the direction of 249° (T) at 2 knots throughout. The Gyro was known to be 1° (L). Find the following:

- (i) Position of the vessel at 1800 hours. (10 marks)
- (ii) Compass course and speed made good. (10 Marks)
- (iii) From 1900 position, set course to pass Bill Of Portland ($50^{\circ} 32'.0$ N; $002^{\circ} 27'.5$ E) 10.0 miles abeam to port if same conditions prevail. (10 Marks)

$50^{\circ} 11' 00''$
 $004^{\circ} 16' 00''$
 315°
 291°
 249°
 2
 18
 1
 10.0

10.4

DIRECTORATE OF MERCHANT SHIPPING
GOVERNMENT OF SRI LANKA

Class IV
Navigation
(Co-W)

Part 2
Subject 2

CERTIFICATE OF COMPETENCY EXAMINATION

GRADE : OFFICER INCHARGE OF A NAVIGATIONAL WATCH
ON SHIPS OF (i) 500 GT OR MORE (UNLIMITED)
(ii) LESS THAN 3000 GT (NCV)

SUBJECT : COASTAL NAVIGATION.

DATE : 22nd June 2006

Time allowed THREE hours

Total Marks 150

Answer ALL questions

Pass Marks 70%

Formulas and intermediate steps taken in reaching your answer should be clearly shown.

Use Deviation card no I and variation as given in the chart. Positions in the chart given for your guidance only.

(01) Sketch/ Write and show the chart symbols for the following as per Chart 5011.

- (i) Remains of a wreck or other foul area no longer dangerous to surface navigation .
- (ii) Sounding of a doubtful depth.
- (iii) Submerge wreck over which the exact clearance is unknown but known to have a clearance of 20 m over it, not dangerous for surface navigation..
- (iv) Precautionary area.
- (v) Recommended direction of traffic flow (04 marks each)

(02) Find the earliest time in the morning on 13th September 1999 to cross a bar at entrance to Boulogne - Sur - Mer (Lat. $50^{\circ} 44' N$; Long. $001^{\circ} 35' E$) in France fulfilling the following requirements. Arrival draft of the vessel 9.2m. Vessel is required to have an under keel clearance of 0.7 m at the bar for safe passing, which has a charted depth of 2.3 m

(25 marks)

(03) Your vessel departed 5' miles south of Les Pierres Noires light (Lat. $48^{\circ} 19.5' N$; Long. $004^{\circ} 55' W$) to Boulogne (Lat. $50^{\circ} 44' N$; Long. $001^{\circ} 35' E$) at 0900 hrs on 13th September 1999. Vessel drew 9 meters and could make 16 knots.

- (i) Plan the intended passage and clearly plot the courses and the way points en-route. (20 marks)
- (ii) Evaluate the currents (rate and direction) you expect to encounter during the passage from the available data. (10 marks)
- (iii) Justify giving reasons for choosing your track and indicate the navigational aids and methods you would utilize for position fixing. (10 marks)
- vi) Calculate the ETA at ~~shelter~~ ^{Boulogne} disregarding the external forces. (05 marks)

(04) At 1000 hrs, a navigator made an observation of horizontal sextant angle between Nab Tower ($50^{\circ} 40' N$; $000^{\circ} 57' W$) and St. Catherine Light ($50^{\circ} 35' N$; $001^{\circ} 18' E$) at 41° . The St. Catherine Light bore 315° (T) at the same time. Vessel was steering 255° (G) at 17 Knots. The Gyro read 1° (H). At 1100 hrs, the observer read St. Catherine Light to bear 011° (G) at 16.5 miles. The vessel intends to reach a position 7.0 miles North of Channel Light Float ($49^{\circ} 54.5' N$; $002^{\circ} 54' W$). Required to calculate the following,

- (i) Position of the vessel at 1000 hours. (07 marks)
- (ii) Set and drift between 1000 hrs and 1100 hrs. (05 marks)
- (iii) Compass course made good between the same leg.. (08 marks)
- (iv) Compass course to steer counteracting the current from 1100 hrs to reach the intended position (10 marks)

(05) A vessel steering 067° (G) at 12 knots observed Start Point light ($50^{\circ} 14' N$; $003^{\circ} 38' W$) to bear 025° (G) at 1200 hrs and at 1330 hrs the same point bore 316° (G). A tidal stream was setting in the direction of 155° (T) at 2 knots throughout. The Gyro was known to be 1° (H). Find the following;

- (i) Position of the vessel at 1200 hours. (10 marks)
- (ii) Gyro course to steer from 1330 hrs to pass the Anvil Point ($50^{\circ} 35' N$; $001^{\circ} 56' W$) 12 miles off. (10 marks)
- (iii) Find the time when Anvil point abeam.. (10 Marks)

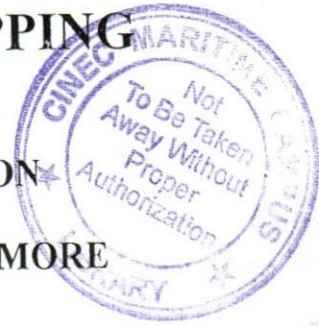
**DIRECTORATE OF MERCHANT SHIPPING
GOVERNMENT OF SRI LANKA**

CERTIFICATE OF COMPETENCY EXAMINATION

GRADE : CHIEF MATE / MASTER ON SHIPS OF 500 GT OR MORE

SUBJECT : SHIPBOARD OPERATIONS.

DATE : 13th July 2006



Time allowed THREE hours

Total Marks 180

Answer ALL questions

Pass Marks 70%

Formulae and intermediate steps taken in reaching your answer should be clearly shown. You may draw sketches wherever considered necessary.

Marks for each question are shown in brackets.

1. (a) Briefly explain the following.

- i) Transportable Moisture Content
- ii) Moisture Migration
- iii) Angle Of Repose
- iv) Flow State
- v) Moisture Content

(02 marks each)

(b) Explain in detail, the test procedure for cargoes, which may liquefy as per the BC Code

(15)

2. With regard to the IMDG Code,

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)

b) What do you understand by the following columns in the dangerous goods list?

(i) Limited Quantities

(ii) Subsidiary Risk.

(06 marks each)

c) Describe the documents to be collected prior to load a dangerous cargo container.

(08)

3) With reference to tanker operations, answer the followings;

(a) Explain how a build up of static electricity can occur during a discharging operation of crude oil (10)

(b) What are the methods applied to prevent such a build up and precautions adopted to eliminate possible accidents. (10)

(c) Explain the main features of a shipboard oil pollution emergency plan. (10)

- 4) (a) Translation of sea water through ship's ballast water has grown into a sizable proportion where it has threaten the environmental balance thus causing harm to ecosystems and biodiversity at some areas. Analyze the statement giving examples. (15)
- b) What measures have been proposed and agreed by MEPC to bring the situation under control and to minimize/eliminate the adverse effects of such invasive migrant species? (15)
- 5) (a.) Describe with the aid of a labeled sketch the following initial stability conditions, when applied to a freely floating vessel in the up righting condition.
- i) Stable ii. Unstable iii. Neutral (09)
- (b) Drew a diagram of the vessel heeled to a small angle by an external force to illustrate the righting levers associated with the three conditions in question 5 a. (09)
- (c) On one set of axis, draw representative curves of righting levers for the three conditions in question 5 a. (12)
- 6) A vessel is to load grain (stowage factor 1.39 m³) into several compartments to a total displacement of 13250 t,

The vessel prior to loading grain has a KG 8.50 m. The compartments are loaded as follows;
 Note: The KG of each of the full compartments is the centroid of the space.

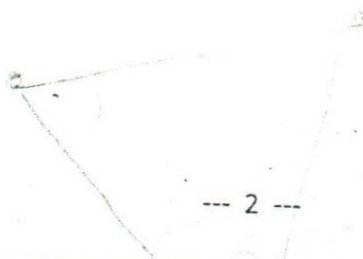
GRAIN SPACE m ³	Hold	Grain Space m ³	KG (m)	Transverse VHM (m ⁴)
2215	1 L.H.(Full)	215	5.08	659.5
4672	2 L.H.(Full)	672	4.95	850.0
1536	3 L.H.(Full)	536	4.94	770.0
3454	4 L.H.(Full)	1454	4.95	760.0
1675	2 T.D.(Full)	675	10.78	659.0

No. 03 T.D is loaded to an ullage of 2.80 m. Refer to Data sheet Q.6(a)

Determine with the aid of Datasheet Q.6(b), "Table of Maximum Permissible Heeling Moments", whether the vessel complies with the minimum requirements under the statutory grain rules.

(30)





$\frac{10}{60} \times 70$

- (i) Locate the vessel's position at 0900 Hrs. (05 Marks)
- (ii) Propose a route to reach Eastern Bunkering B anchorage safely. Give the courses and distances to steer with reasons for choosing such a track. Evaluate the various methods of position fixing available en-route. (20 Marks)
- (iii) Find the Compass course to steer during the passage between Longitudes $103^{\circ} 54' E$ and $104^{\circ} 00' E$ while experiencing a set of $320 (T) \times 4$ knots. (10 Marks)

(04) At 1000hrs an observer made the following observations. Buffalo Rock Isolated Danger buoy ($01^{\circ} 09.9' N, 103^{\circ} 48.15' E$) and Karang Banteng spindle Buoy ($01^{\circ} 09.42' N, 103^{\circ} 48.25' E$) gave a horizontal sextant angle of 33° . At the same instant Karang Banteng buoy bore $074^{\circ} (T)$. Vessel was proceeding along the East bound TSS lane heading $063^{\circ} (T)$ at 18 knots. After 20 minutes of steaming observer read Batu Berhanti isolated danger buoy ($01^{\circ} 11.75' N, 103^{\circ} 52.5' E$) to bear $015^{\circ} (T) \times 0.7'$.

- (i) Find the position of vessel at 1000 Hrs. $01^{\circ} 9.55'$ (10 Marks)
- (ii) Find the position of vessel at 1020 Hrs. $103^{\circ} 48.25'$ (05 Marks)
- (iii) Evaluate the set and drift experienced. (15 Marks)
- (iv) What dangers would you anticipate during this short passage due to the special features in the area of transit and explain the precautions taken. (10 Marks)

(05) At 1130 Hrs an observer in the Eastern Anchorage made the following observations. South Kallang buoy ($01^{\circ} 16.78' N, 103^{\circ} 52.58' E$) bore due North and Buran light buoy ($01^{\circ} 15.15' N, 103^{\circ} 50.9' E$) bore $244^{\circ} (T) \times 1.87'$ miles. it was known that a current of $325 (T) \times 3$ Knots was setting through the area. Vessel is to weigh anchor and proceed to Eastern Fairway (position $01^{\circ} 16.85' N, 103^{\circ} 54.5' E$). Vessel draws 10m and can make 12 knots. $01^{\circ} 15.95'$

- (i) Find the position at first observation. $103^{\circ} 52.975'$ (05 Marks)
- (ii) Find the Compass course to steer to reach the given location, counteracting the current. $79^{\circ} (T) \quad 229^{\circ} (T)$ (20 Marks)
- (iii) What will be the vessel's ETA at the Eastern Fairway $11h 39m 21s$ (10 Marks)

speed = $\frac{dis}{T_m}$

104

~~11h 39m 21s~~ ~~06 104~~
11h 39m 21s

$\frac{160}{110} \quad \frac{11.5}{100} \quad \frac{88.5}{99.5}$

$0^{\circ} 10' E \quad 2009 \quad (2' N) \quad 110$

$\frac{1}{11} \times 1.5 = 1.36$

$006 \quad 110 \quad 10.5 \quad 99.5$
 $109.2 \quad 9.13 \quad 110$
 $120 - 9 \quad 111$

$\frac{1.5}{11.5} \times$

Chethura

DIRECTORATE OF MERCHANT SHIPPING GOVERNMENT OF SRI LANKA

CERTIFICATE OF COMPETENCY EXAMINATION

GRADE : OFFICER IN CHARGE OF A NAVIGATIONAL WATCH ON SHIPS OF
(i) 500 GT OR MORE (UNLIMITED)
(ii) LESS THAN 3000 GT ON NEAR COASTAL VOYAGES

SUBJECT : COASTAL NAVIGATION

DATE : 05TH July 2010 , 0900 Hrs to 1200 Hrs

Time allowed **THREE** hours

Answer **ALL** questions

Total Marks 150

Pass Marks 70%

Formulae and intermediate steps taken in reaching your answer should be clearly shown.

Positions of various navigational marks indicated in the paper are for your guidance only.

Use Deviation card No.1 and Variation as given in the chart.

(01) Sketch/write and show the chart symbols for following as per Chart 5011.

(i) Height contour 40 metres.

(ii) Tidal springs rated 2 knots with the direction of movement shown.

(iii) Anchoring and Fishing prohibited area.

(iv) Single point mooring bell buoy with an underwater pipe line connection, mounted with a light giving five flashes every 10 seconds visible at 8 miles.

(v) Minaret placed at 162m above chart datum.



Handwritten notes: 2 knots



(04 Marks each)

(02) Find the latest time on 05th July 1999, to cross a bar with a charted depth of 13.6m at the entrance to Holy Head (Wales, United Kingdom) Lat. 53° 19' N, Long. 004° 37' W. Your vessel is drawing 13.2m and required to keep an under keel clearance of 2m to make a safe approach.

2400 hrs

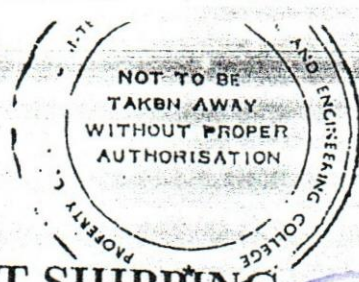
(20 Marks)

(03) Your vessel is a 242m long sized crude carrier laden to draw 13.2m, moving along Jong Fairway at 14 knots is fitted and operational with all mandatory equipment for a vessel of her size. She reported to VTIS Singapore (Vessel Traffic Information System) at 0900 hrs while passing the South Easterly reporting point (abreast of Sisters light , L. Fl.10s at 01° 12.4' N , 103° 48.8' E). You are to reach designated anchorage "N" at Eastern Bunkering "B" safely. You shall follow the recommended traffic routes and VTIS instructions.

Contd/...2



W. S. K. Fernando



W
11

DIRECTORATE OF MERCHANT SHIPPING GOVERNMENT OF SRI LANKA



CERTIFICATE OF COMPETENCY EXAMINATION

GRADE : OFFICER INCHARGE OF A NAVIGATIONAL WATCH
ON SHIPS OF (i) 500 GT OR MORE (UNLIMITED)
(ii) LESS THAN 3000 GT (NCV)

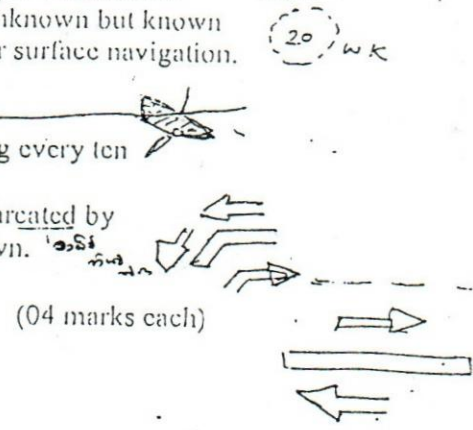
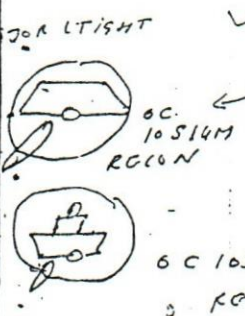
SUBJECT : COASTAL NAVIGATION.
DATE : 03rd April 2006.

Time allowed THREE hours
Answer ALL questions
Formulas and intermediate steps taken in reaching your answer should be clearly shown.
Use Deviation card no I and variation as given in the chart. Positions in the chart given for your guidance only.

Total Marks 150
Pass Marks 70%

(01) Sketch/ Write and show the chart symbols for the following as per Chart 5011.

- (i) Submerge wreck over which the exact clearance is unknown but known to have a clearance of 20 m over it, not dangerous for surface navigation.
- (ii) Nature of sea bed having Sand and Corals.
- (iii) Lighted wreck.
- (iv) A light float fitted with a Racon and a light, occulting every ten seconds, visible up to 14 Miles.
- (v) A traffic separation scheme with its extremities demarcated by separation lines and the direction of traffic flow shown.



(04 marks each)

(02) Find the earliest time on 21st June 1999 to cross a bar at Plymouth (Devonport), England (Lat. 50° 22' N; Long. 004° 11' W) with a draft of 9.8m. Vessel is required to have an under keel clearance of 1.8m at the bar for safe passing, which has a charted depth of 9.0m

22 51 17
01 1.9
11.1
11.7

(30 marks)

20 22 51 17
11.7
11.7
11.7

ACPCAT

(03) At 0600 hrs on 02nd December 2002, your vessel disembarked pilot off Nab Tower (50° 42' N; 000° 58' W) (at the Eastern approach Channel to Portsmouth) and received orders to proceed and remain around Parsons Bank (48° 26' N; 006° 32' W) for further advice. Vessel is fitted with all required navigational equipment and placed at your disposal. Vessel has capability of making 20 knots at sea.

(i) Plan a safe passage to reach the instructed waiting area in accordance with applicable safe practices and good seamanship. Justify the causes for choosing your intended track.

(08 marks)

(ii) Clearly plot the way points and the courses en-route.

(10 marks)

(iii) Evaluate the currents (rate and direction) you expect to encounter during the passage from the available data.

(10 marks)

(iv) What steps do you propose to maintain the intended track?

(07 marks)

v) What is your ETA at Parsons bank area disregarding the current?

(05 marks)

(04) At 2300 hrs, a vessel steering 260° (T) @ 14 Knots observed Start point (50° 13' N; 003° 38.5' W) to bear 345° (T) at 9.2 miles. One hour later, Eddystone Rocks Light (50° 11' N; 004° 16' W) bore 315° (T) at 18.7 miles. The vessel intends to pass Lizard Point (49° 57' N; 005° 12' W) 7.0 miles abeam to starboard. Find the following.

(i) Position of the vessel at 2400hrs.

(08 marks)

(ii) Set and Drift experienced.

(05 marks)

(iii) Compass course to steer from 2400 hrs. position, counteracting the current to pass Lizard Point as planned.

(10 marks)

(iv) Time of having Lizard Point Light abeam to starboard.

(07 marks)

(05) A vessel steering 020° (T) at 15 knots observed Bishop's Rock (49° 52.5' N; 006° 27' W) light to bear 330° (G) at 1400 hrs, Next observation 30 minutes later was the Wolf rock (49° 57' N; 005° 49' W) and the bearing was 018° (G). A tidal stream was setting in the direction of 180° (T) at 4.5 knots throughout. The Gyro was known to be 2° (L). Find the following;

(i) Position of the vessel at 1400 hours.

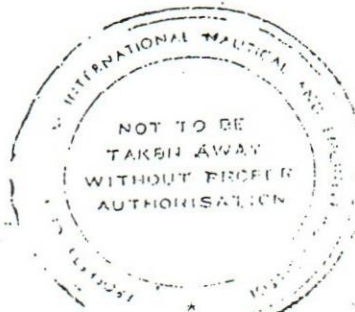
(15 marks)

(ii) Compass course made good during the period.

(10 marks)

(iii) Speed made good during the period.

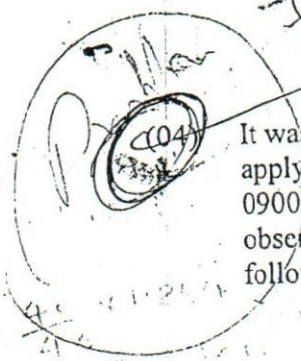
(05 Marks)





(03) Your vessel is a loaded bulk carrier awaiting orders near Parsons bank ($48^{\circ} 25' N$: $006^{\circ} 35' W$) and proposing to discharge at Southampton ($50^{\circ} 53' N$: $001^{\circ} 23' W$). Her average speed is 12.5 Kts and drawing 12m.

- (i) Plan the intended passage and illustrate it on the chart provided, with all the standard information. (20 marks)
You shall comply all international and local traffic regulations.
- (ii) Evaluate the methods adaptable for position fixing en route. (05 marks)
- (iii) If your ETD Parsons bank is on 19th September 1999 at 1800hrs, calculate the rates and drifts of tidal streams you would expect to encounter during the passage. (10 marks)
- (iv) Calculate the ETA Southampton pilot boarding ground taking in to account the predicted tidal streams. (10 marks)



It was observed that the vertical sextant angle of the light house (height after applying the tide 40m) at Lizard Point ($49^{\circ} 58' N$: $005^{\circ} 12' W$) was $45'$ at 0900hrs. Same time the light house bore $335^{\circ} (T)$. The height of the eye of the observer was 18m and Index error of the sextant was $2.0'$ on the Arc. Find the following.

- (i) Position of the vessel at 0900hrs. (15 marks)
- (ii) If the vessel can maintain a speed of 15 kts and the current prevailed was $070^{\circ} (T) \times 4Kts$. Find the compass course to steer to pass start point at a distance of 10 miles (15 marks)



(05) A vessel steering $084^{\circ} (G)$ at 23 Kts observed Barfleur light ($49^{\circ} 42' N$: $001^{\circ} 17' W$) to bear $152^{\circ} (G)$ at 0700hrs. After 30 minutes the same light bore $195^{\circ} (G)$. If the vessel was experiencing a set of 4 Kts on the direction of $045^{\circ} (T)$ Find the following. Consider the gyro error $01^{\circ} (H)$.

- (i) Position of the vessel at 0700 hrs. ✓
- (ii) Position of the vessel at 0800 hrs. ?
- (iii) Gyro course to steer to bring the vessel to intended track in one hour. (10 marks each)

Handwritten calculations and diagrams:

96°
 083°
 SEX ANGLE $415'$
 $43'$
 DIST OF = $\frac{HT OF OBS}{SEX ANG} \times 1.4$
 $\frac{40}{43} \times 1.854$
 $= 1.72$
 BEARING - ALT HURST = $335^{\circ} (T)$
 DIST = 1.7
 $19^{\circ} W$

(17)

DIRECTORATE OF MERCHANT SHIPPING

GOVERNMENT OF SRI LANKA



CERTIFICATE OF COMPETENCY EXAMINATION

K21

**GRADE : OFFICER INCHARGE OF A NAVIGATIONAL WATCH
ON SHIPS OF (i) 500 GT OR MORE (UNLIMITED)
(ii) LESS THAN 3000 GT (NCV)**

SUBJECT : COASTAL NAVIGATION.

DATE : 19TH September 2005

0.940
12.400

Time allowed THREE hours


Answer ALL questions

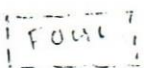
Total Marks 150


Pass Marks 70%

Formulas and intermediate steps taken in reaching your answer should be clearly shown.
Use Deviation card no II and variation as given in the chart. Positions in the chart given for your guidance only.

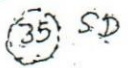
(01) Sketch/ Write and show the chart symbols for following.

(i) Wreck dangerous for surface navigation. 

(ii) Remains of a wreck or other foul area, not dangerous for surface navigation. 

(iii) Fish haven. 

(iv) Precautionary area. 

(v) Sounding of doubt full depth. (35m) 

(04 marks each)

(02) Find the earliest time on 19th September 1999 to approach Portsmouth harbour, England ($50^{\circ} 48' N$; $001^{\circ} 07' W$) with a draught of 10.6m.

Required to have an under keel clearance of 3m at the entrance of the harbour which has a charted depth of 10.5m.

(25 marks)

$$\begin{array}{r} 10.6 \\ - 3.0 \\ \hline 13.6 \\ - 10.5 \\ \hline 3.1 \end{array}$$

JIT: 3.1 (M)

DIRECTORATE OF MERCHANT SHIPPING
GOVERNMENT OF SRI LANKA.

CERTIFICATE OF COMPETENCY EXAMINATION.

GRADE : MASTER ON SHIPS OF LESS THAN 500 GT (NCV)

SUBJECT : COASTAL NAVIGATION

DATE : 27 October 2005 0900 HRS To 1200 HRS.

Time allowed THREE hours.

Total marks 150

Answer ALL questions.

Pass mark 70%

Formulas and all intermediate steps taken in reaching your answer should be clearly shown. Use deviation card No. II and Variation as given in the chart. Positions of locations on the chart are given for your guidance only.

(1) Sketch/Write and show the chart symbols for the following ,

- (i) Precautionary area.
- (ii) Marine farm.
- (iii) Nature of sea bed shells, Corals and Rock.
- (iv) Fixed bridge with a vertical clearance of 15m.
- (v) Radio/Television mast.

(05 marks each)

(2) Find the latest time on 27th June, 1998 to cross a shoal at Elephant point, Burma (Lat. 16 29'N, Long . 096 18 E) for vessel having a draft of 6.2m. It is advised to maintain an under keel clearance of 2.5m. The charted depth at the shoal was known to be 4.8m.

(25 marks)

(3) You are in a General cargo vessel, anchored 3 miles due South of Hambanthota and intending to proceed to Colombo Harbour for loading. She draws 6.5 m and can maintain a average speed of 15kts,

(i) Plan the intending passage and illustrate it on the chart provided, with all the standard information. (25 Marks)

You shall comply all international and local traffic regulations.

(ii) If you weigh anchor at 1300hrs 27th October, find the ETA to Colombo pilot Boarding grounds. (10 Marks)

(iii) Evaluate the methods adaptable for position fixing en-route

(10 Marks)

288
90
378
360
018

245
90
335



- (4) At 1000hrs While steering a course of 292° (C) at a speed of 12 kts, Dondra Head Lt bore 032° (C). At 1100hrs the same Light bore 080° (C). If the ship was experiencing a current towards 227° (T) at 2.5kts throughout, Find the following.

- (i) Position of the vessel at 1100hrs. (10 Marks)
 (ii) Course and speed made good by the vessel. (10 Marks)
 (iii) Compass course to steer to pass Point de Galle 5 miles off. (10 Marks)

- (5) Horizontal sextant angle between Little Basses Lt and Pillinawa Pt observed to be 35° . At the same time Little Basses reef Lt bore 040° (G). If the Gyro error is 2° (H) Find position of the vessel at the time of observation. (25 Marks)

4011
84
7927W

032
3 57
292
2' 25"

3' 57

225°

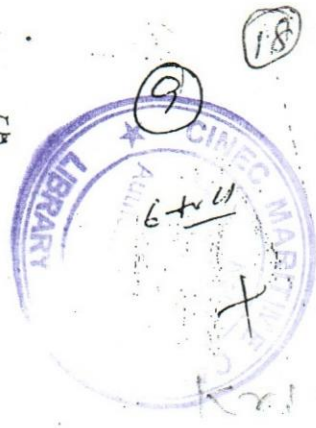
90
35
55

038°

60
57
117
92
25

3 30 W
27 W
3° 03' W
3' 57

*
DIRECTORATE OF MERCHANT SHIPPING
GOVERNMENT OF SRILANKA.



CERTIFICATE OF COMPETENCY EXAMINATION.
GRADE : OFFICER INCHARGE OF A NAVIGATIONAL WATCH
ON SHIPS OF (i) 500 GT OR MORE.
(ii) LESS THAN 3000GT ON NCV

SUBJECT : COASTAL NAVIGATION
DATE : 22nd JUNE 2005, 0900 HRS TO 1200 HRS.

Time allowed **THREE** hours.
 Answer all questions.

Total marks 150
 Pass mark 70%

Formulas and all intermediate steps taken in reaching your answer should be clearly shown. Use deviation card no1 and variation as given in the chart. Position of places on chart are given for your guidance only.

(1) Sketch, Write and show the chart symbols for the following as per chart 5049.

- (i) Submarine Supply pipe line for chemicals.
- (ii) Wreck over which exact depth is unknown. But which is considered to have a safe clearance of 25m.
- (iii) Remains of a wreck or other foul area no longer dangerous to surface navigation.
- (iv) Radio direction finding station.
- (v) Radio/ Television tower.

(4 marks each)

(2) Find the latest time in June 1999 to enter Portsmouth harbour full filling the following requirements.
 Vessel drawing 8.9m. Under keel clearance to be maintained 1.5m. The charted depth of the entrance to the harbour was known to be 8.1m.

(25 marks)

(3) Your vessel is a bulk carrier loading at Plymouth Harbour and Proposing to discharge at Le Havre (49° 30' N: 00° 10' W). Her average speed is 15 Kts and laden draft will be 11m

(i) Plan the intended passage and illustrate it on the chart provided, with all the standard information.

You shall comply all international and local traffic rules.

(20 marks)

V/L DRAUGHT = 8.9
U.K.C. = 1.5
22 - 1835 - 0000
5.30



- (ii) Evaluate the methods adaptable for position fixing en-route. (05 marks)
- (iii) If your ETD Plymouth is on 22nd June 1300 hrs, State the rate and drift of tidal stream you would expect to encounter during the passage. (10 marks)

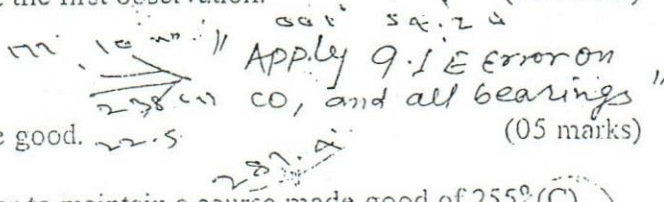
- (iv) Calculate the ETA Le Havre pilot boarding grounds taking in to account the predicted tidal stream in each leg of the voyage. (10 marks)

C = 339
 D = 1.9° E
 M = 335.9
 V = 3.4° W
 T = 332.5
 E = 8.1.5° W
 TUE = 332.5 CT

255° = DAV = 12.5°
 = 267.5°
 334° = DAV = 14° E
 = 336°
 267° = DAV = 13.7° E
 = 281°
 032° = DAV = 8.2° W
 = 23.8°
 342° = DAV = 2.1° E
 = 344.1°
 C = 255°
 D = 12.9° E
 M = 267.5
 V = 3.4° W
 T = 264.9
 E = 9.1° E
 T = 255 + 9.1 = 264.1
 C = 267°
 D = 13.7° E
 M = 280.7
 V = 3.4° W
 T = 277.3
 E = 10.3° E
 T = 267 + 10.3 = 277.3 CT

(4) A vessel steering 255° (C) at 20 kts speed observed Anvill Pt light (50° 36' N : 001° 57' W) bearing 334° (C) and Bill of Portland Lt (50° 31' N : 002° 28' W) bearing 267° (C) at the same time. After one hour the vessel observed the Anvil Pt Light bearing 032° (C) and Bill of Portland light bearing 342° (C). Find the following.

- (i) Position of the vessel at the first observation. (05 marks)
- (ii) Set and drift prevailed. (05 marks)
- (iii) Course and speed made good. (05 marks)
- (iv) Compass Course to steer to maintain a course made good of 255° (C). (10 marks)



(5) At 1000hrs a vessel observed a Horizontal sextant angle of 61° 40' between Guernsey Light (49° 26.5' N : 002° 43' W) and Less Roches Douvres Light (49° 07' N : 002° 49' W). The Latter bore 127 (G) at the same time. The Index error of the sextant was 4.0' on the arc and the gyro compass was 2° (H) The vessel was heading for Brixham (50° 25' N : 003° 25' W) to receive a deep sea pilot and a current of 4 Knts was setting at 043° (T). If the average speed of the vessel is 14 Kts. Derive the following.

- (i) Position of the vessel at 1000 hrs. (10 marks)
- (ii) The Compass course to steer for counteracting the current. (10 marks)
- (iii) ETA Brixham Pilots. (10 marks)

240° 11° E = 251°
 250° 12° E = 262°
 Bearing: 320° ± 9 = 311° Anvil Point
 Bore = 267° ± 9 = 276° Bill of Portland
 C = 255°
 D = 10.5° E
 M = 267.5°
 V = 3.4° W
 T = 264.1°
 E = 9.1° E
 C = 255 + 9 = 264°
 Brixham Pilot = 032 + 9 = 41°
 Bill of Portland = 342 + 9 = 351°

Index No 05 / 4018 / N

DIRECTORATE OF MERCHANT SHIPPING
GOVERNMENT OF SRILANKA.

CERTIFICATE OF COMPETENCY EXAMINATION.

GRADE : OFFICER INCHARGE OF A NAVIGATIONAL WATCH
ON SHIPS OF (i) 500 GT OR MORE.

(ii) LESS THAN 3000GT ON NCV

SUBJECT : OPERATIONAL SAFETY.

DATE : 22ND JUNE 2005, 1300 HRS TO 1600 HRS.

Time allowed THREE hours.

Total marks 180

Answer all questions.

Pass mark 60%

Formulas and all intermediate steps taken in reaching your answer should be clearly shown. You should draw sketches when ever required

(1)(a) Explain the following .

With regard to solid bulk cargo,

(i) Dust explosion.

(ii) Trimming.

(iii) Separate longitudinally by an intervening complete compartment.

With regard to liquid hydrocarbon cargo.

(iv) Cavitation.

(v) Inert atmosphere.

(05marks each)

(b) List the advantages of cargo battens (spar ceiling) employed in cargo ships.

(05 marks)

(2)(a) Sketch and explain a Three Fold Purchase In use to advantage and disadvantage.

(10 marks)

(b) A three fold purchase is used to lift a weight of 3T. Calculate the minimum size of manila rope that can be used in this purchase.

Consider The factor of safety to be 6 and allow 12% of load per sheave for friction.

The rig is weightless.

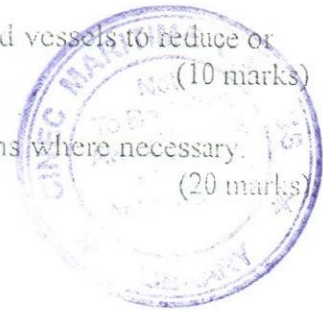
(20 marks)

(3) (a) What are the methods which can be employed on board vessels to reduce or prevent corrosions.

(10 marks)

(b) Explain two methods of above with the use of diagrams where necessary.

(20 marks)



Impressed Current Type
Sealed Case Type

(4) Write short notes on

- (i) Ballast water management as per the ballast water convention.
- (ii) BC code.
- (iii) LSA code.
- (iv) Load line convention.
- (v) SOLAS

(06 marks each)

(5) List the safety precautions you should take,

- (i) Before sending a person to a double bottom tank for inspections.
- (ii) Encountering heavy weather.
- (iii) Taking fresh water.

(10 marks each)

(6) List the line of action in the following circumstances.

- (i) Observed an unknown person entered to a restricted area.
- (ii) Observation of smoke seeping through the Forecastle stores door while cargo work is in progress.
- (iii) While anchored, observed an oil patch around the vessel.

(10 marks each)

Stew

1974, 1978

F 1965

DIRECTORATE OF MERCHANT SHIPPING
GOVERNMENT OF SRI LANKA

Class III
Navigation
(C.O.W)

CERTIFICATE OF COMPETENCY EXAMINATION
GRADE : OFFICER IN CHARGE OF A NAVIGATIONAL WATCH ON
SHIPS OF (i) 500 GT OR MORE

(ii) LESS THAN 3000 GT ON NCV

SUBJECT : OPERATIONAL SAFETY

DATE : 13TH December 2004 , 1300 hrs to 1600 hrs.

Time allowed THREE hours

Total Marks 180

Answer ALL questions

Pass Marks 60%

Formulae and all intermediate steps taken in reaching your answer should be clearly shown . You may draw sketches wherever considered necessary .

(1) With regard to the IMDG Code ,

(a) The "Blue Books" were available for usage and guidance since 1969. But it was only recommendatory over three decades . The revised version came into be mandatory for compliance since 01st January 2004 . How this was achieved ?

(10 Marks)

(b) On a single package of hazardous material placed on board for carriage you find two "Classes" of labels pasted with same prominence. What does this mean to you?

(10 Marks)

(c) Apart from the labels mentioned in the above (b) how do you identify whether that Commodity is a mild / medium / severe Marine Pollutant ?
How indications to that effect is shown on the package ?

(10 Marks)

(2)(i) Sketch and explain how a " Three Fold purchase " could be used for ,

(a) Advantage

(b) Disadvantage

(05 Marks each)

(ii) A three fold purchase rigged to disadvantage is utilized for lifting a weight of 24 tonnes

Calculate the minimum size of the steel wire rope of 6 x 24 strands construction that should be used in the purchase to handle the load safely . Consider the factor of safety to be five and allow 12% load per sheave lost on friction . The rig could be considered weightless

$$6 \times 24 = \frac{200}{500} \text{ (20 Marks)}$$

Contd...../02

$$S = \frac{W + W_n \times Pr}{6}$$
$$S = \left(\frac{24 + 24 \times 6 \times \frac{12}{100}}{6} \right)$$

(3)(a) Translocation of sea water through ships' Ballast water has grown into a sizable proportion where it has threatened the environmental balance thus causing harm to ecosystems and biodiversity at some areas. Analyze this statement giving examples.

(10 Marks)

(b) What methodology has been proposed to minimize / eliminate the adverse effects of such invasive migrant species ?

(10 Marks)

(c) Propose what records you would suggest to maintain with regard to ballast water management and related operations.

(10 Marks)

(4) Write short notes on the following ,

(a) Load Line Convention

(b) FAL Convention

(c) ISPS Code

(d) Globallast Programme

(e) BIMMS Conference

(f) Articles of Agreement

(05 Marks each)

(5)(a) Discuss how the objectives of the ISM Code is achieved ,

(i) On board the vessel .

(ii) At shore based management .

(15 Marks)

(b) Propose an emergency Muster list for a boiler explosion in the machinery space . Explain the various duties you would entrust on the individuals to handle the eventualities ;

(15 Marks)

(6)(a) Availability of an Inert Gas system on board a Crude Oil carrier ensures safe operation. Sketch and explain how this is achieved .

(18 Marks)

(b) In choosing the kind of Inert Gas what factors should be considered ?

(06 Marks)

(c) Explain the advantages of having an Inert Gas system on board a tanker over any other system .

(06 Marks)

6

DIRECTORATE OF MERCHANT SHIPPING
GOVERNMENT OF SRI LANKA

CERTIFICATE OF COMPETENCY EXAMINATION
GRADE : MASTER ON SHIPS OF LESS THAN 500 GT (NCV)
SUBJECT : COASTAL NAVIGATION
DATE : 13th September 2004 , 0900hrs. TO 1200 hrs.

Time allowed THREE hours.

Total Marks 150

Answer ALL questions.

Pass Marks 70 %

Formulae and all intermediate steps taken in reaching your answer should be clearly shown .Use Deviation Card No. II and Variation as given in the chart. Positions of locations on the Chart are given for your guidance only .

- (1) Sketch/Write and show the chart symbols for the following as per Chart 5011,
(i) Cluffy coast .
(ii) A light fitted with a Racon and having an occulting red light shown to a distance of eight miles .
(iii) Dry dock (Graving).
(iv) Nature of seabed being rock and mud.
(v) A naval submarine exercise area into which entry is prohibited .
(vi) Submerged coral reef having a clearance of 0.8 metres of water at the chart datum.

(05 Marks each)

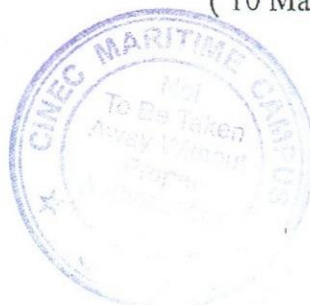
- (2) Your vessel draws 6.8m . Required to maintain an under keel clearance of 1.0 m at all times . The chart datum reads 0.3m at a bar near Bhavnagar (21° 45' N , 072° 14' E) , India West Coast . Find the latest time to cross the bar on 13th September 1998 .

(25 Marks)

- (3) At 1000 hrs your vessel was off Great Basses Reef with Dorawa Point bearing 310 (T) x 10.0 miles. The vessel was experiencing a current of 040 (T) at 4.0 Knots until passing through Dondra Head Traffic Separation Scheme . From the 1000 hrs. position the vessel has to proceed to a location off Galbokka Light house Brg. 090 (T) x 5.0 miles . Your vessel can steam at 14 knots . Required to find the following.

- (a) Position of the vessel at 1000 hrs. (05 Marks)
(b) Propose a route to pass Dondra Head to starboard safely , following through the TSS counteracting the current . (20 Marks)
(c) Compass course steered between Dondra Head and Galle Light house . (15 Marks)
(d) ETA off Galbokka Light . (10 Marks)

Contd/...2



(4) At 1100 hrs, an observer read out the horizontal sextant angle between Weligama light and the Point De Galle Light as 63° . At the same instant the Point De Galle Light bore 337° (T). The vessel has to proceed to a position 8.0 miles South of Little Basses Light and await orders. Vessel can make 16 knots :

- (a) Find the position of the vessel at the time of the observation . (15 Marks)
- (b) Plan a route to reach Great Basses safely. Explain what methods of position fixing you could adopt during the passage . (20 Marks)
- (c) ETA at the destination . (10 Marks)



L.M.M.A. 4011

DIRECTORATE OF MERCHANT SHIPPING
GOVERNMENT OF SRI LANKA

CERTIFICATE OF COMPETENCY EXAMINATION

GRADE : OFFICER IN CHARGE OF A NAVIGATIONAL WATCH
ON SHIPS OF (i) 500 GT OR MORE

(ii) LESS THAN 3000 GT ON NCV

SUBJECT : COASTAL NAVIGATION

DATE : 13th September 2004, 0900 hrs. TO 1200 hrs.

Time allowed THREE hours.

Total Marks 150

Answer ALL questions.

Pass Marks 70 %

Formulae and all intermediate steps taken in reaching your answer should be clearly shown. Use Deviation Card No. 1 and Variation as given in the chart. Positions of places on the Chart are given for your guidance only.

(1) Sketch/Write and show the chart symbols for the following as per Chart 5011,

(i) Submerged wreck over which the exact clearance is unknown but known to have a clearance of 20m over it, not dangerous to surface navigation.

(ii) Fishing stakes.

(iii) Nature of sea bed having pebbles and shingles.

(iv) A light float fitted with a Racon and a light of occulting every ten seconds visible to 14 Miles and having a horn sounding every 45 seconds.

(v) A traffic separation scheme with its extremities demarcated by separation lines and the direction of traffic flow shown.

(04 Marks each)

(2) Find the earliest time in the morning on 13th September 1999 to cross a bar at the entrance to Boulogne - Sur-Mer (Lat. 50° 44' N, Long. 001° 35' E) in France fulfilling the following requirements. Arrival draft of your vessel 9.2m. It is advised to maintain an under keel clearance of 0.7metres at the bar for safe passing. Charted depth reads 3.2 metres.

(25 Marks)

(3) Your vessel departed Boulogne (50° 44' N, 001° 35' E) at 0900 hrs. on 13th September 2004 bound for Brest (48° 22' N, 004° 29' W). But due to adverse weather conditions it was decided that the vessel should seek shelter near the Channel Islands around 8 miles West of Cap de Flamanville (49° 33.5' N, 001° 54' W). Vessel drew 9 metres and could make 16 knots.

(i) Propose a route to reach the shelter. Clearly plot the courses and the way points en-route.

(15 Marks)

(ii) Analyze the currents (rates and directions) experienced along the proposed track using the available data.

(15 Marks)

Contd...../2

(3)Continued ,

- (iii)Justify giving reasons for choosing your track and indicate the navigational aids and methods you would utilize for position fixing . (10 Marks)
- (iv)Calculate the ETA at shelter disregarding the external factors . (05 Marks)

(4)A vessel is steaming at 16 knots while on a course of 259° (G) , observed a horizontal sextant angle between Bill of Portland ($50^{\circ} 31' N$, $002^{\circ} 27' W$) and Anvil Point ($50^{\circ} 35' N$, $001^{\circ} 57' W$) to be $73^{\circ} 5'$. The Gyro error was 2° (H) and the IE of the sextant was $5'$ on the arc. The Bill of Portland light bore 290° (T) at the same time. HE of the observer was 12 m .The vessel experienced a set of 3 knots in the direction of 200° (T).

- (i)Find the position of the vessel at the first observation. (10 Marks)
- (ii)What is the Compass Course made good by the vessel. (15 Marks)

Now the vessel has to set course to pass Start Point ($50^{\circ} 13' N$, $003^{\circ} 38' W$) eight miles on the starboard beam from the current position .

- (iii)Find the Compass course to steer assuming all given conditions remain constant throughout . (15 Marks)
- (iv)How long would the vessel take to pass Start Point on her beam ? (10 Marks)

The vessel requires to pass the Lizard Point ($49^{\circ} 58' N$, $005^{\circ} 12' W$) five miles off on her starboard with the current changing its direction to 210° (T) at 4 knots.

- (v)Find the true course to be steered by the vessel , counteracting the current . (10 Marks)

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(4)

DIRECTORATE OF MERCHANT SHIPPING
GOVERNMENT OF SRI LANKA

CERTIFICATE OF COMPETENCY EXAMINATION

GRADE : OFFICER IN CHARGE OF A NAVIGATIONAL WATCH
ON SHIPS OF (i) 500 GT OR MORE

(ii) LESS THAN 3000 GT ON NCV

SUBJECT : OPERATIONAL SAFETY

DATE : 21st June 2004 , 1300 hrs. TO 1600 hrs.

Time allowed **THREE** hours.

Total Marks **180**

Answer **ALL** questions.

Pass Marks **60 %**

Formulae and all intermediate steps taken in reaching your answer should be clearly shown . You may draw sketches where ever required .

✓(1)(a)With regard to Petroleum Hydrocarbons , explain the following ,

- (i)Non Flammable Range
- (ii)Ignition Temperature
- (iii)Inert Atmosphere
- (iv)Combustible Gas Detector
- (v)Sludge accumulation

(04 Marks each)

(b)With regard to Marine Pollution by discharge of oily wastes ,

- (i)What Certificates are carried by an Oil Tanker engaged in international Trade ? Who are exempted from such requirements ?
- (ii)What liabilities are covered by CLC ?

(05 Marks each)

✓(2)Sketch and explain a fixed CO₂ fire extinguishing installation covering the cargo holds of a dry cargo vessel . Explain the following .

- (i)Detection and Operation . (15 Marks)
- (ii)Testing procedure (07 Marks)
- (iii)Advantages / Disadvantages compared with a sprinkler installation . (08 Marks)

(3)(a)Sketch and describe an Union Purchase derrick rig with its components .

(15 Marks)

(b)How could you utilize this set of derricks to handle a heavier load than it is rated for union purchase handling ?

(10 Marks)

(c)What are the advantages of having an union purchase rig on board against other kinds of rigs ?

(05 Marks)

Contd.... / 02

(4) Write short notes on the following .

- (i)ISM Code
- (ii)ISPS Code
- (iii)SOPEP
- (iv)Management of Ballast water and sediments
- (v)Port State Control
- (vi)STCW 1978 as amended 1995

(05 Marks each)

(5)(a) Freight could be charged based on either volume or weight measurement .
How are the various cargoes categorized accordingly ? (08 Marks)

(b) A vessel is booked to carry the following cargo on her next voyage .

Bagged Cement 8000 tonnes , S.F. 0.8 M/T .

Steel Rails 4000 tonnes , S.F. 0.5 M/T .

Bale capacities of each hold is listed below .

Hold No. 1 - 1400 M³

Hold No. 2 - 2100 M³

Hold No. 3 - 3300 M

Hold No. 4 - 2400 M

Hold No. 5 - 2800 M

Draw up a suitable cargo plan placing above two commodities proportionately in each hold . (22 Marks)

(6) With regard to IMDG Code ;

(a) What are the objectives of IMDG Code ? (05 Marks)

(b) How are the Marine Pollutants categorized ?

What identification is available for you when you handle them ? (13 Marks)

(c) In the unfortunate event of incurring a fire with hazardous cargo how will you handle the casualties on board ? (12 Marks)

DIRECTORATE OF MERCHANT SHIPPING
GOVERNMENT OF SRI LANKA

CERTIFICATE OF COMPETENCY EXAMINATION
GRADE : OFFICER IN CHARGE OF A NAVIGATIONAL WATCH
ON SHIPS OF (i) 500 GT OR MORE
(ii) LESS THAN 3000 GT ON NCV

SUBJECT : OPERATIONAL SAFETY

DATE : 22nd December 2003 , 1300 hrs. TO 1600 hrs.

Time allowed THREE hours.

Total Marks 180

Answer ALL questions.

Pass Marks 60 %

Formulae and all intermediate steps taken in reaching your answer should be clearly shown. You may draw sketches where ever required.

(1)(a)With regard to tanker operations , explain the following

- (i)Flammable Range
- (ii)Ullage
- (iii)Flash Point
- (iv)Ignition Point
- (v)Sedimentation
- (vi)Inert Atmosphere

(05 Marks each)

(2)(a)Sketch and explain how a "Five Fold " purchase is used ,

- (i)To advantage
- (ii)To Disadvantage

(05 Marks each)

(b)A five fold purchase rigged to advantage is used to lift a weight of eighty tonnes . Calculate the minimum size of the steel wire rope of 6 x 24 strands construction that should be used in the purchase to handle the shipment safely. Consider the factor of safety to be 6 and allow 10% load per sheave for friction . The rig is weightless .

(20 Marks)

(3)With regard to the new IMDG Code ,

(a)The new version is considered more user friendly than before . Explain how this has been achieved in comparison to the older version.

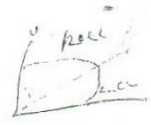
(15 Marks)

(b)What changes have taken place in referring to the methods of handling emergencies ? (i.e. In case of Fire / Contamination / Spillage etc.)

(15 Marks)

Contd.... / 02

$\frac{800 \times 10}{100} = 2 \frac{8000}{100}$



0034



(4)(a) With reference to concentrated solid bulk cargoes explain the following .

- (i) Flow Moisture Point
- (ii) Moisture Migration
- (iii) Transportable Moisture Limit (06 Marks each)

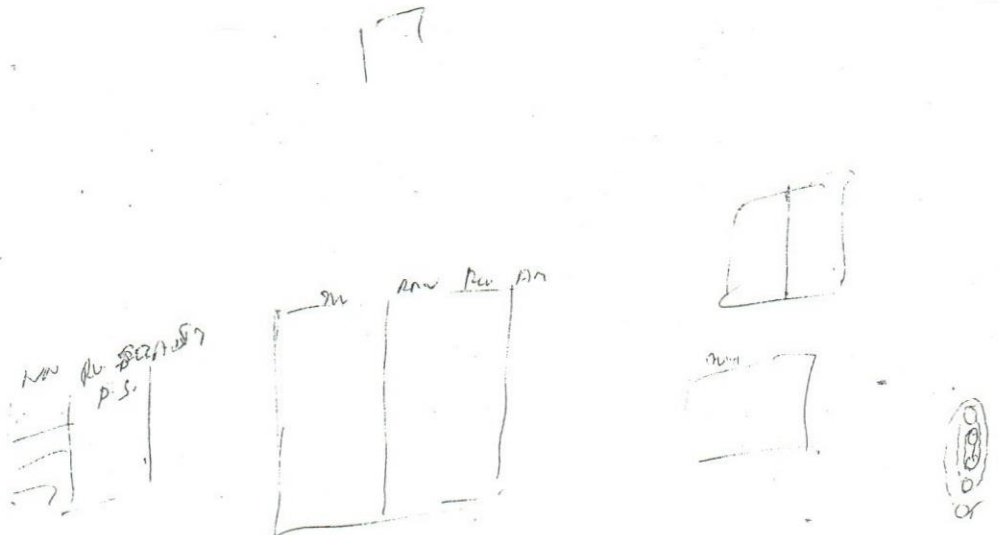
(b) With special reference to angle of repose discuss the main features and compare the guide lines you would adhere when carrying a grain cargo against concentrated dry bulk cargo . (12 Marks)

(5)(a) Galvanic action causes the vessels to deteriorate fast. Discuss how this phenomenon is taking place . (15 Marks)

(b) Sketch and explain a system where this principle has been put into use in a shipboard environment to protect the vessel . (15 Marks)

(6)(a) What are the objectives of ISM Code and discuss how these are achieved ,
(i) On board a vessel
(ii) At shore based management (15 Marks)

(b) Draw up an emergency muster list for an explosion inside an Engine Room . Explain the various duties you would entrust on the individuals for facing the eventualities . (15 Marks)



13

20

DIRECTORATE OF MERCHANT SHIPPING
GOVERNMENT OF SRI LANKA

CERTIFICATE OF COMPETENCY EXAMINATION
GRADE OFFICER IN CHARGE OF A NAVIGATIONAL WATCH
ON SHIPS OF (i) 500 GT OR MORE
(ii) LESS THAN 3000 GT ON NCV

SUBJECT : OPERATIONAL SAFETY

DATE : 12 th May 2003 , 1300 hrs. TO 1600 hrs.

Time allowed THREE hours.

Total Marks 180

Answer ALL questions.

Pass Marks 60 %

Formulae and all intermediate steps taken in reaching your answer should be clearly shown. You may draw sketches where ever required.

-
- (1)(a) With reference to concentrated bulk cargoes define the following .
- (i) Flow Moisture Point (03 Marks)
 - (ii) Transportable Moisture Limit (04 Marks)
 - (iii) Moisture Migration (03 Marks)
- (b) With reference to solid bulk cargoes ,
- (i) What importance does the Angle of Repose play when bulk is carried on board a non purpose built vessel . (10 Marks)
 - (ii) On a purpose built vessel , dangers discussed in above (i) have been successfully eliminated . Explain the constructional features developed to overcome the risks . (10 Marks)
- (2)(a) Seagoing ships made of steel are constantly floating in salt water . The hull is preserved by application of various coats of paint . Explain how this preservation is achieved chemically . (15 Marks)
- (b) Similar protection can be achieved galvanically when dissimilar metals are present . Explain in detail how such a system is utilized for hull protection . (15 Marks)
- (3) With regard to the new IMDG Code ,
- (a) Explain the terms "Hazardous" , " Harmful " and " Noxious " in relation to the various commodities presented for shipment .
 - (b) On a package loaded on board you find two classes of labels placed . What does this mean and what is your concern , explain .
 - (c) Apart from the labels mentioned in above (b) how do you identify whether a commodity is a mild / medium / severe Marine Pollutant ? How the indications are placed on the package to that effect ? (10 Marks each) ,
- Ralam*

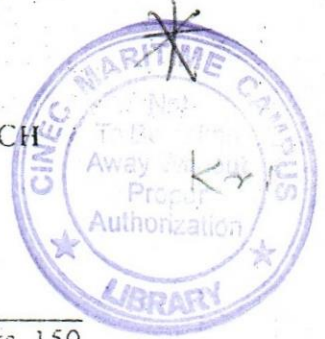
Contd.... / 02

Approved

- (4)(a) Sketch and explain how a "Luff Tackle" could be used to ,
(i) Advantage
(ii) Disadvantage (05 Marks each)
- (b) A five fold purchase rigged to advantage is utilized in lifting a weight of 60 tonnes . Calculate the minimum size of steel wire rope 6x24 strands construction that should be used in the purchase to handle the load safely . Consider the factor of safety to be 5 and allow 20% load per sheave for friction The rig to be considered weightless . (20 Marks)
- (5) Sketch and explain a fixed CO fire extinguishing installation fitted for cargo holds on board a dry cargo vessel . Elaborate your approach on the following .
(i) Detection and operation .
(ii) Testing Procedure .
(iii) Advantages / Disadvantages (30 Marks)
- (6)(a) With regard to Petroleum Hydrocarbons , explain the following ,
(i) Non Flammable Range
(ii) Ignition Temperature
(iii) Flash Point
(iv) Inert atmosphere
(v) Combustible Gas Detector (04 Marks each)
- (b) With regard to Marine Pollution by Oil ,
(i) What certificates are carried by an Oil Tanker engaged in International trade ? Who are exempted from such requirement ? (05 Marks)
(ii) What does the Civil Liability Convention cover ? (05 Marks)

DIRECTORATE OF MERCHANT SHIPPING
GOVERNMENT OF SRI LANKA

②



CERTIFICATE OF COMPETENCY EXAMINATION
GRADE OFFICER IN CHARGE OF A NAVIGATIONAL WATCH
ON SHIPS OF (i) 500 GT OR MORE
(ii) LESS THAN 3000 GT ON NCV

SUBJECT: COASTAL NAVIGATION

DATE: 04th November 2003, 0900 hrs. TO 1200 hrs.

Time allowed **THREE** hours.

Total Marks **150**

Answer **ALL** questions.

Pass Marks **70 %**

Formulae and all intermediate steps taken in reaching your answer should be clearly shown. Use Deviation Card No. 1 and Variation as given in the chart. Positions of places on the Chart are given for your guidance only.

(1) Sketch/Write and show the chart symbols for the following as per Chart 5011,

- (i) Mast whose position is known to be approximate → Mast PA
 - (ii) An underwater tunnel → Tunnel
 - X (iii) Submerged obstruction with a wire swept clearance of 12.5 m water at chart datum. → 12.5
 - (iv) Least depth of 15.3 m in a narrow channel → 15.3
 - (v) Deep water track within a traffic separation scheme → 15.3
- (04 Marks each)

(2) Find the latest time on 04th November 1997 to depart Leith, Scotland (Lat. 55° 59' N, Long. 003° 11' W) with a draft of 13.2 metres. Required to have a clearance of 3.0 metres below the keel at the bar. The chart datum at the bar reads 13.8 metres.

(25 Marks)

(3) Your vessel is a laden tanker awaiting orders in position 048° 08' N 005° 00' W. At 0900hrs, on 04th November orders received to proceed to Boulogne, France (050° 44' 0" N, 001° 34' 0" E) for discharging.

- (i) Propose a route to reach Boulogne safely. Care should be taken to comply all local and international traffic rules. Give your way points, true courses and the distances to steer. Give reasons for choosing such a track. Evaluate the various methods of position fixing you could adopt en-route.

(20 Marks)



250

12

262 } 11

$\frac{1}{11}$

252

2

0.5

1.0

(3) Continued

(ii) Analyze the rates and the directions of the tidal streams you would expect to encounter (using available data) during the passage .

(10 Marks)

(iii) Find the Compass course to steer during the passage between EC 1 (050 06' N , 001 48.3' W) and EC 3 (050 18.5' N , 000 36.5' W) if the vessel experienced a current of 4.0 Knots setting in the direction of 160 (T) during that leg .

060 (T)

(15 Marks)

(4) A vessel steering 255 (G) at 18 knots South of St. Catherine Point (050 35' N , 001 18' W) observed St. Catherine Point Light to bear 320 (T) x 13 miles at 1100 hrs. Next observation after steaming for one hour, St. Catherine Light gave a bearing of 090 (T). The gyro was 2 H. Find the following .

- (i) Position of the vessel at 1100 hrs. (03 Marks)
- (ii) Position of the vessel at 1200 hrs. (05 Marks)
- (iii) Set and drift experienced (07 Marks)
- (iv) Speed Made good (03 Marks)
- (v) Compass Course Made good (07 Marks)

25'

(5) At 1000 hrs. a vessel observed a horizontal sextant angle of 77 when passing off Lizard Point (049 57.5' N , 005 12.5' W) and Wolf Rock Light (049 56.5' N , 005 48.5' W). Wolf Rock light bore 330 (T) at the same time. The vessel intends to pass Bishop Rock (049 52.5' N , 006 27' W) abeam to starboard 9.0' off. The current was setting 210 (T) at 4.0 knots. The vessel is steaming at 16 knots on a course of 270 (T).

25'

Required to calculate the following .

- i) Position of the vessel at 1000 hrs. (08 Marks)
- ii) Compass course to steer to pass the Bishop Rock as intended (12 Marks)
- (ii) Time of Bishop Rock coming abeam on the starboard side (10 Marks)

(i)

(4)

DIRECTIONS OF MERCHANT SHIPPING
GOVERNMENT OF SRI LANKA

CERTIFICATE OF COMPETENCY EXAMINATION
GRADE : OFFICER IN CHARGE OF A NAVIGATIONAL WATCH
ON SHIPS OF, (i) 500 GT OR MORE
(ii) LESS THAN 3000 GT ON NCV

SUBJECT : COASTAL NAVIGATION

DATE : 24 th September 2001, 0900 hrs. TO 1200 hrs.



Time allowed THREE hours.

Total Marks 150

Answer ALL questions.

Pass Marks 70%

Formulae and all intermediate steps taken in reaching your answer should be clearly shown. Use Deviation Card No. 1 and Variation as given in the chart.

(1) Sketch/Write and show the chart symbols for the following as per Chart 5011,

- (i) A Graving dock (Dry Dock)
- (ii) Ocean Data Acquisition Buoy fitted with a Racon and a Light flashing every 15 seconds visible for 15 miles
- (iii) Clifflly coast
- (iv) Mangroves
- (v) A light house fitted with occulting red, white and green lights into following sectors respectively : Red from $000^{\circ}(T)$ to $120^{\circ}(T)$, white from $120^{\circ}(T)$ to $240^{\circ}(T)$ and green from $240^{\circ}(T)$ to $360^{\circ}(T)$.

(04 Marks each)

(2) Find the earliest time on 24 th September 1999 to cross a bar at the entrance to Cowes (Lat. $50^{\circ} 46' N$, Long. $001^{\circ} 18' W$) in England fulfilling the following requirements . Arrival draft of your vessel 7.5 M . It is advised to maintain a an under keel clearance of 0.8 M . The charted depth at the entrance was known to be 7.5 M .

(25 Marks)

(3) Your vessel was awaiting orders near Parsons Bank ($48^{\circ} 25' N$, $006^{\circ} 35' W$) in depth of around 99 M . Orders received at 1200 hrs. on 24 rd September to proceed to Southampton ($50^{\circ} 53' N$, $001^{\circ} 23' W$) for loading . Find the following ,

- (i) Position of the vessel at 1200 hrs. on 24 rd September . (05 Marks)
- (ii) Propose a route to reach the destination clearly giving the way points , true courses and distances to steer . Justify the reasons for choosing

Contd. 2/2

- (3) (ii) Continue *from* your proposed track. Evaluate the various methods of position fixing you could utilize during the passage. (20 Marks)
- (iii) Analyze the rates and directions of the tidal streams you would expect to encounter (using available data) during the passage. (10 Marks)
- (iv) True course to steer between EC 1 ($50^{\circ} 06' N$, $001^{\circ} 49' W$) Light buoy and Needles pilot boarding ground ($50^{\circ} 37' N$, $001^{\circ} 40' W$) if the vessel experienced a current of $260^{\circ} (T)$ at the rate of 5 knots during that leg. *5 knots speed 12k*. (10 Marks)

(4) A vessel steering $090^{\circ} (T)$ at 15 knots observed Bishop's Rock ($49^{\circ} 52.5' N$, $006^{\circ} 27' W$) light to bear $33^{\circ} (G)$ at 1400 hrs. Next observation 30 minutes later was the Wolf Rock ($49^{\circ} 57' N$, $005^{\circ} 49' W$). A tidal stream was setting in the direction of $180^{\circ} (T)$ at 4.5 knots throughout. The Gyro was known to be 2 E.

Find the following.

- (i) Position of the vessel at 1400 hrs. (15 Marks)
- (ii) Compass course made good during the period. (10 Marks)
- (iii) Speed made good during the period. (05 Marks)

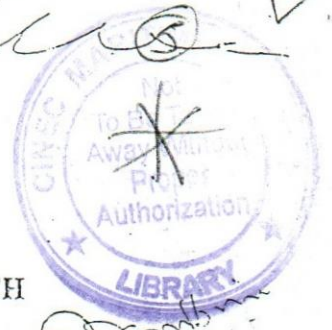
(5) At 1200 hrs a vessel observed a horizontal sextant angle of 90° when passing off Wolf Rock ($49^{\circ} 56' N$, $005^{\circ} 49' W$) and Lizard Point ($49^{\circ} 58' N$, $005^{\circ} 12' W$). Lizard Head light bore $052^{\circ} (G)$ at the same time (The Gyro was 2 E). The vessel intends to pass Eddystone Rocks Light ($50^{\circ} 11' N$, $004^{\circ} 16' W$) 10.0 miles off on the port side while counteracting a current of 4 knots setting $045^{\circ} (T)$. Ship is steaming at 18 knots.

Required to obtain the following.

- (i) Position of the vessel at 1200 hrs. (08 Marks)
- (ii) Compass course to steer to pass the Eddystone Light as intended. (15 marks)
- (iii) Time of Eddystone Rocks Light coming abeam on the port side. (07 Marks)

✓

DIRECTORATE OF MERCHANT SHIPPING
GOVERNMENT OF SRI LANKA



CERTIFICATE OF COMPETENCY EXAMINATION
GRADE : OFFICER IN CHARGE OF A NAVIGATIONAL WATCH
ON SHIPS OF, (i) 500 GT OR MORE

(ii) LESS THAN 3000 GT ON NCV

SUBJECT : COASTAL NAVIGATION

DATE : 09 th JULY 2001, 0900 hrs. TO 1200 hrs.

Time allowed **THREE** hours.

Total Marks **150**

Answer **ALL** questions.

Pass Marks **70 %**

Formulae and all intermediate steps taken in reaching your answer should be clearly shown. Use Deviation Card No. 1 and Variation as given in the chart.

(1) Sketch/Write and show the chart symbols for the following as per Chart 5011,

(i) A light float fitted with a Racon and having alternate flashing red & white lights shown to a distance of six and eight miles respectively.

(ii) Single point mooring buoy facility connected to shore with a submarine pipeline. Also fitted with an aeronautical radio beacon and a light long flashing two every ten seconds.

(iii) Wire swept approach channel to a port with a clear depth of fifteen metres along its entire length.

(iv) Nature of sea bed being Sand and Shingles.

(v) Reporting point within a traffic controlled area showing the direction of traffic movement.

(04 Marks each)

(2) Find the latest time on 09 th July 1999 to cross a bar at the entrance to Rosyth harbour (Lat. $56^{\circ} 01' N$, Long. $003^{\circ} 27' W$) in Scotland fulfilling the following requirements. Arrival draft of your vessel 9.1 M. It is advised to maintain an under keel clearance of 1.0 M. The charted depth at the entrance was known to be 5.0 M.

$22^{\text{nd}} 25^{\text{th}}$

(25 Marks)

(3) Your vessel dropped the outward pilot off Le Havre Light Float ($49^{\circ} 30' N$, $00^{\circ} 10' W$) on 09 th July before noon. Shortly afterwards at 1200 hrs. the vessel was fixed with Le Havre Light Float Brg. 291 (T) distance 5.6 miles. Vessel draws 9.2 M and steams at 16.5 Knots. Vessel has to proceed to the port of Dover ($51^{\circ} 07' N$, $001^{\circ} 19' E$) for loading.
Calculate the following.

Contd.../2

- (i) Position of the vessel at 1200 hrs. (05 Marks)
- (ii) Propose a route to reach the destination clearly giving the way points, true courses and distances to steer. Justify the reasons for choosing your proposed track. Evaluate the various methods of position fixing you could utilize during the passage. (20 Marks)
- (iii) Analyze the rates and directions of the tidal streams you would expect to encounter (using available data) during the passage. (10 Marks)
- (iv) True course to steer between Greenwich Light Float ($50^{\circ}24.5' N, 000^{\circ}00'$) and Basurelle Light Buoy ($50^{\circ}33' N, 000^{\circ}58' E$) if the vessel experienced a current of $200^{\circ}(T)$ at the rate of 5 Knots during that leg. (10 Marks)

- (4) A vessel read the vertical sextant angle of Lizard Point ($49^{\circ}58' N, 005^{\circ}12' W$) as 48° at 0900 hrs. The true bearing of Lizard Point at the same time was $335^{\circ}(T)$. Height of the light house was 43 M. HE of the observer was 18 M and the IE of the sextant was $3.0'$ on the arc. From this position the vessel has to proceed to Berry Head pilots boarding ground ($50^{\circ}25.5' N, 003^{\circ}25' W$). The vessel can steam at 15 knots and she experienced a set and drift of $060^{\circ}(T)$ @ 5 knots until passing Start Point. Find the following.
- (i) Position of the vessel at 0900 hrs. (disregard the height of tide) (10 Marks)
 - (ii) Compass courses and distances to steer on each leg to reach Berry Head. (Use deviation card No. 1) (20 Marks)
 - (iii) ETA at the destination (05 Marks)

- (5) At 1000 hrs, a vessel steering $270^{\circ}(T)$ speed 12 knots observed the horizontal sextant angle between Eddystone Rocks Light ($50^{\circ}11' N, 004^{\circ}16' W$) and Start Point Light ($50^{\circ}13' N, 003^{\circ}38.5' W$) to be 089° . During this passage a current was known to be setting $170^{\circ}(T)$ at 3.5 Knots. Required to obtain the following.
- (i) Position of the vessel at 1000 hrs. $50^{\circ}04' / 041^{\circ} W$ (10 Marks)
 - (ii) Compass course steered and speed made good. 11.5 (10 marks)
 - (iii) Time of Eddystone Rocks Light coming abeam and the distance (05 Marks)

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**THE PRESIDENTIAL SECRETARIAT
MERCHANT SHIPPING DIVISION**

(3)
books file

CERTIFICATE OF COMPETENCY EXAMINATION

GRADE : OFFICER IN CHARGE OF A NAVIGATIONAL
WATCH ON SHIPS OF ,

- (1)
- (a) 500 GT OR MORE
(b) LESS THAN 3000 GT

SUBJECT : OPERATIONAL SAFETY

DATE : 18 TH JUNE 1999 , 0900 hrs. TO 1200 hrs.

Time allowed THREE hours

Total Marks 180

Answer all questions each question carries equal marks.

Pass Marks 60 %

Sketches to be shown wherever necessary

(1)(a) What are the advantages of having an Inert Gas gas installation on a Crude Oil tanker with respect to safety during a discharging operation. What factors govern the basis of choosing the Inert Gas ? (12 Marks)

(b) Explain briefly with a block diagram the basic functions and the components of an Inert Gas system on a tanker . (18 Marks)

(2)(a) Sketch the following purchases and state the velocity ratio (VR) of each one when used to advantage.

(i) Gun Tackle

(ii) Luff Tackle

(5 Marks each)

(b) A three fold purchase used to advantage is to be used for lifting a weight of 25 t . Calculate the minimum size of the steel wire rope (6 x 24) that should be used in this purchase . Consider the factor of safety to be 6 and allow 10% load per sheave for friction . Rig is weightless . (20 Marks)

Contd... 2/-

1 - 28

5 - 26

2 - 30

6 - 29

3 - 28

163

4 - 22

$\frac{163}{180} =$

91%

(3)(a) What basic guidelines are used for charging freight on cargo carried on board vessels? (5 Marks)

(b) Deadweight available on a vessel is 5260 t. She has to replenish following before proceeding to sea. Bunker fuels 550 t, Fresh water 300 t, Provisions and other stores 100 t. The hold capacities of the vessel is as follows. Hold nos. 1, 2, 3, 4 measure 1530, 2100, 1580, 1620 respectively. The Stowage Factors of the two commodities to be loaded are 1.3 and 2.2 M/t. The vessel should utilize all available space. Draw a stowage plan with detailed quantities of each commodity placed in the holds. (25 Marks)

(4)(a) Briefly explain following (i) Hygroscopic Cargo ^{L.P. 4 SP.}
(ii) Non Hygroscopic Cargo ^{P. 4 SP.} (5 Marks each)

(b) When a vessel carried a cargo of tea from Sri Lanka to Europe in December the cargo was ventilated freely. The receiver complained that the consignment was badly damaged when delivered at the discharging port. Explain what has taken place and how would you manage this cargo if given the responsibility. (20 Marks)

(5)(a) What is meant by "Cathodic Protection"? ^{L.P. 4 SP.} (15 Marks)

(b) Sketch and explain a system where it is utilized in a shipboard environment. (15 Marks)

(6)(a) Some cargoes are termed as "Safe" for carriage but some are termed as "Hazardous". What does this statement mean to you? (15 Marks)

(b) With regard to IMDG code briefly explain how you would handle a variety of cargoes labeled "Hazardous" if given for carriage at the same time. (15 Marks)

Southern