



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 v  
(Ministry)  
1999-2022**

|   |                       |  |                                |
|---|-----------------------|--|--------------------------------|
| <i>Document Control &amp; Approving Authority</i> |                       | <i>Senior Director - Quality Management &amp; Administration</i> |                                |
| <i>1<sup>st</sup> Issue Date: 2017.011.30</i>     | <i>Revision No.00</i> | <i>Revision Date: 16.012022</i>                                  | <i>Validated by: Librarian</i> |





Library.  
**MERCHANT SHIPPING SECRETARIAT**  
**GOVERNMENT OF SRI LANKA**  
**CERTIFICATE OF COMPETENCY EXAMINATION**

0 034

ND Class  
V

GRADE : OFFICER IN CHARGE OF A NAVIGATIONAL WATCH ON SHIPS OF  
LESS THAN 500 GT (NCV)

SUBJECT : **BRIDGE EQUIPMENT**

DATE : 03<sup>rd</sup> may 2016 0900Hrs to 1200Hrs

Time allowed THREE hours

Total marks : 100

Answer all questions

Pass marks : 50%

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

1. With reference to Sextant ;

i. State what "Error of Perpendicularity" is, how it is identified and corrected for.

(12 marks)

ii. List in sequence the three adjustable errors and explain why there are two correcting screws found on the reverse side of "Side mirror".

(08 marks)

2. Answer the following with regard to GPS;

i. List the data that can be obtained.

(05 marks)

ii. Explain what is meant by World Geodetic System.(WGS 84).

(05 marks)

iii. Explain Atmospheric and Multipath errors that degrade the accuracy of GPS system.

(10 marks)

3. a. With reference to Long Range Identification and Tracking (LRIT) explain how the system operate.

(10 marks)

b. With reference to Chronometer, state what "Chronometer error" and "Daily rate" is.

(10 marks)

4. a. With respect to Steering system;

i. Explain the switching over procedure from manual steering to Automatic Pilot.

(08 marks)

ii. Explain the function of "Weather Control" fitted to the Auto Pilot system.

(05 marks)

iii. Write short notes on "Course Recorder".

(07 marks)

5. With respect to the Speed Logs;

i. Sketch and explain the function of "Pressure Tube Log".

(14 marks)

ii. State what is meant by Ground and Water reference speeds.

(06 marks)

Library

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

GRADE : OFFICER IN CHARGE OF A NAVIGATIONAL WATCH ON SHIPS OF  
LESS THAN 500 GT (NCV)

SUBJECT : **METEOROLOGY**

DATE : 04<sup>th</sup> may 2016 0900Hrs to 1200Hrs

Time allowed THREE hours

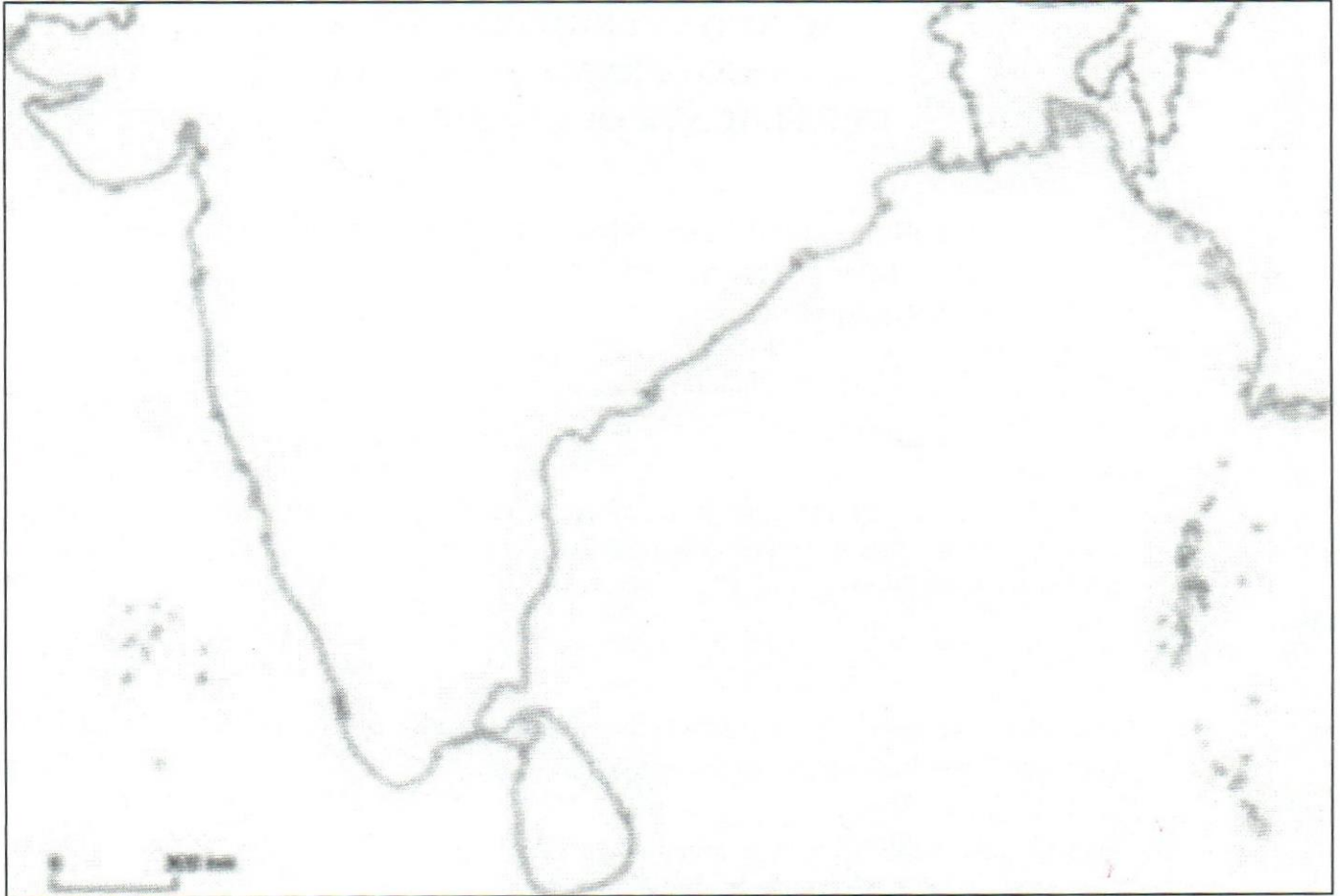
Total marks : 100

Answer all questions

Pass marks : 50%

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

1. On a vessel steaming  $170^\circ$  at 15knots, the apparent wind was observed to be  $260^\circ$  at 20 knots. Find the direction and speed of the true wind.  
(20 marks)
2. (a) Describe the following with relation to a TRS.
  - i. Navigable semi circle
  - ii. Dangerous semi circle(04marks)
- (b) Explain the Buys Ballot Law.  
(06 marks)
- (c) Draw the typical and alternative paths of a TRS in Northern Hemisphere.  
(10 marks)
3. On the given map draw the surface currents in the Bay of Bengal and the Arabian sea during NE monsoon.  
(20 marks)



4. (a) Draw and name the parts of an Aneroid Barometer.

(10 marks)

(b) An Aneroid barometer has an IE of + 1.0 mb. It reads 1012.5 mb. The instrument was located at a height of 15 meters from sea level. What is the reading that you enter in the log book.

(10 marks)

5. Write short notes on following

- a) Relative Humidity
- b) Troposphere
- c) Coriolis Force
- d) Pressure Gradient

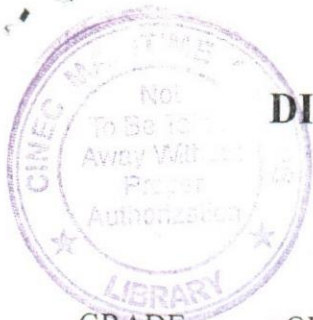
(05 marks each)



Ministry

Class IV

operations



# DIRECTORATE OF MERCHANT SHIPPING GOVERNMENT OF SRI LANKA

## CERTIFICATE OF COMPETENCY EXAMINATION

GRADE : OFFICER IN CHARGE OF A NAVIGATIONAL WATCH ON SHIPS OF  
LESS THAN 500 GT (NCV)

SUBJECT : COASTAL NAVIGATION

DATE : 11<sup>st</sup> August 2014,

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. You may draw sketches wherever required.

1) Identify the charted symbols as per BA 5011 in the following positions on the chart provided (BA 813)

a)  $06^{\circ} 05.0' N, 079^{\circ} 54.0' E$

b)  $06^{\circ} 47.5' N, 079^{\circ} 44.8' E$

c)  $05^{\circ} 55.3' N, 080^{\circ} 35.3' E$

d)  $06^{\circ} 05.8' N, 081^{\circ} 03.3' E$

e)  $06^{\circ} 51.6' N, 079^{\circ} 48.2' E$

(05 marks each)

2) Find the available depth of water at 1230 hrs on 21<sup>st</sup> April 2000 at Trincomalee harbour over a charted depth of 3 m.

(25 marks)

3) Your vessel departed Colombo harbour on 23<sup>rd</sup> and while awaiting orders, at 2000 hrs she observed a horizontal sextant angle of  $32^{\circ}$  between Galbokka light ( $06^{\circ} 56.2' N, 079^{\circ} 50.4' E$ ) and SBM (Single Buoy Mooring) Fl. 10s ( $06^{\circ} 58.7' N, 079^{\circ} 46.5' E$ ). At the same time, the bearing of the Galbokka light was observed as  $102^{\circ}$  (T).

a) Plot the position of the vessel at 2000 hrs.

(10 marks)

b) You receive orders to proceed to Hambantot harbour for loading. Plan a passage from the position obtained at 2000 hrs to reach Hambantota Point ( $06^{\circ} 07.2' N, 081^{\circ} 07.5' E$ ) bearing  $035^{\circ}$  (T) x 2.0' off.

(30 marks)

c) Calculate the ETA assuming the vessel departs the above position at 2100 hrs and at a speed of 13.5 knots.

(10 marks)

4) Answer the following questions in relation to the above passage,

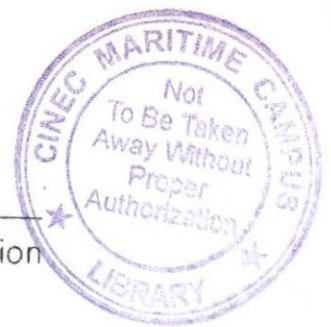
a) List the factors that shall be taken in to account when deciding the position fixing frequency/interval.

(10 marks)

- b) Calculate the true course to steer counteracting an expected current setting  $140^{\circ}$  (T) at a rate of 2 knots, during the east bound passage through the Dondra Head VTS. **(20 marks)**
- c) Using the charted variation and the deviation card provided, calculate the compass course to steer in (b) above. **(10 marks)**
- d) Calculate the speed made good during the passage in above (b) **(10 marks)**



## DEVIATION CARD I



| Ship's Head<br>by Compass | Deviation | Ship's Head<br>by Compass | Deviation |
|---------------------------|-----------|---------------------------|-----------|
| 000°                      | 2.0°W     | 180°                      | 2.0°E     |
| 010°                      | 3.5°W     | 190°                      | 3.5°E     |
| 020°                      | 5.5°W     | 200°                      | 5.0°E     |
| 030°                      | 7.0°W     | 210°                      | 7.0°E     |
| 040°                      | 9.0°W     | 220°                      | 8.5°E     |
| 050°                      | 10.0°W    | 230°                      | 10.0°E    |
| 060°                      | 11.5°W    | 240°                      | 11.0°E    |
| 070°                      | 12°W      | 250°                      | 12.0°E    |
| 080°                      | 12.5°W    | 260°                      | 13.0°E    |
| 090°                      | 12.5°W    | 270°                      | 12.5°E    |
| 100°                      | 11.5°W    | 280°                      | 11.5°E    |
| 110°                      | 10.5°W    | 290°                      | 10°E      |
| 120°                      | 9.0°W     | 300°                      | 8°E       |
| 130°                      | 7°W       | 310°                      | 6.5°E     |
| 140°                      | 5°W       | 320°                      | 4.5°E     |
| 150°                      | 3°W       | 330°                      | 2.5°E     |
| 160°                      | 1°W       | 340°                      | 1.0°E     |
| 170°                      | 0.5°E     | 350°                      | 0.5°W     |
| 180°                      | 2.0°E     | 360°                      | 2.0°W     |

# SRI LANKA - TRINCOMALEE

LAT 8°33'N LONG 81°13'E

TIME ZONE -0530

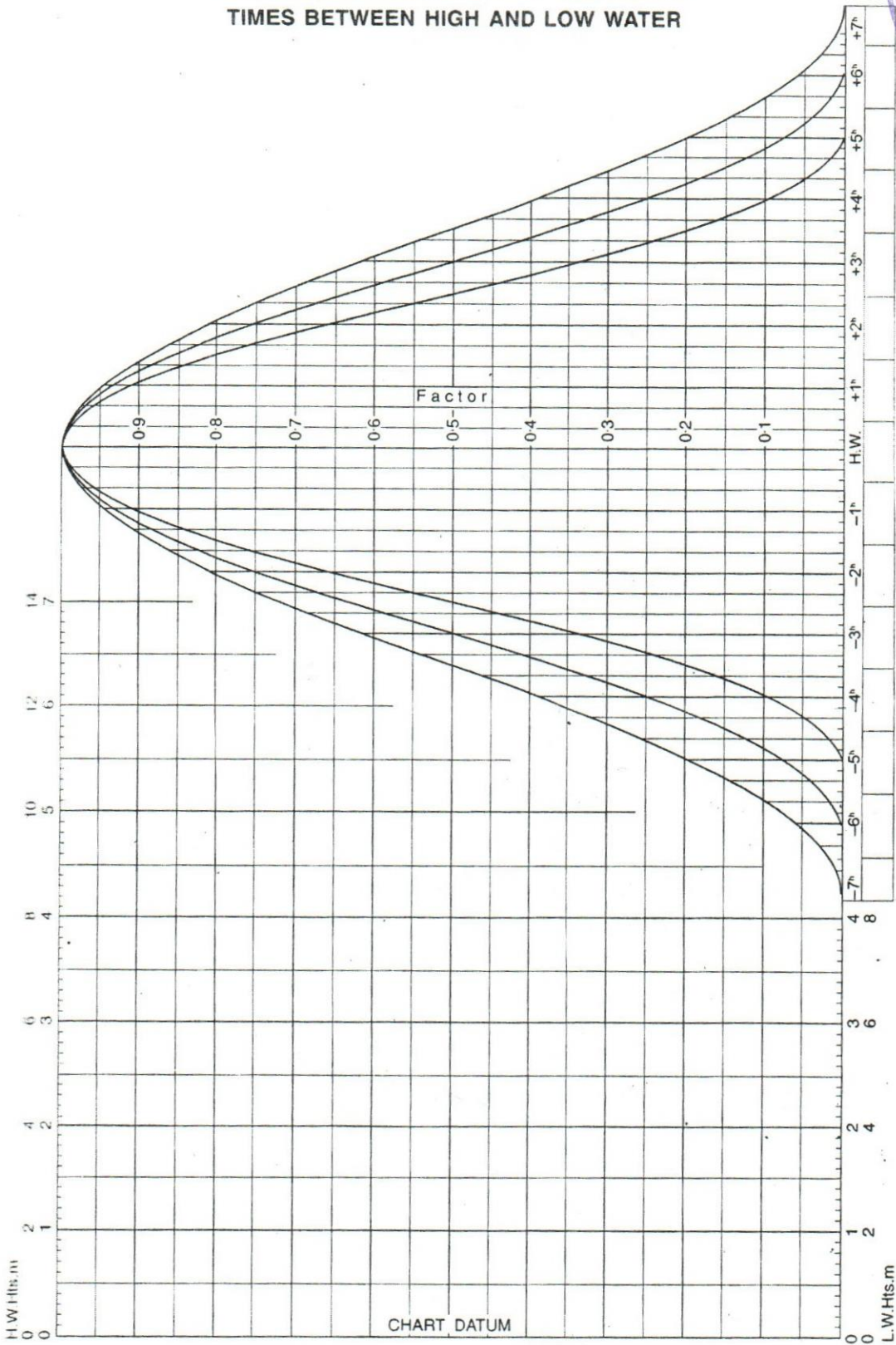
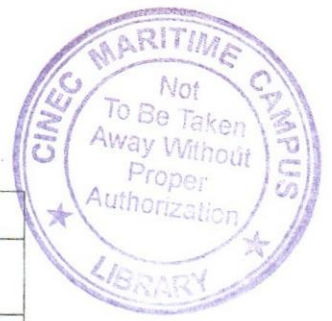
TIMES AND HEIGHTS OF HIGH AND LOW WATERS

YEAR 2000

| JANUARY |     |         |     | FEBRUARY |     |         |     | MARCH   |     |         |     | APRIL   |     |         |     |
|---------|-----|---------|-----|----------|-----|---------|-----|---------|-----|---------|-----|---------|-----|---------|-----|
| Time    | m   | Time    | m   | Time     | m   | Time    | m   | Time    | m   | Time    | m   | Time    | m   | Time    | m   |
| 1 0406  | 0.6 | 16 0233 | 0.6 | 1 0044   | 0.3 | 16 0531 | 0.4 | 1 0032  | 0.3 | 16 0540 | 0.4 | 1 0040  | 0.2 | 16 0055 | 0.1 |
| 1105    | 0.3 | 0932    | 0.2 | 0534     | 0.5 | 1130    | 0.1 | 0522    | 0.4 | 1124    | 0.1 | 0644    | 0.5 | 0707    | 0.6 |
| SA 1726 | 0.7 | SU 1545 | 0.6 | TU 1153  | 0.2 | W 1826  | 0.6 | W 1121  | 0.2 | TH 1808 | 0.6 | SA 1204 | 0.2 | SU 1306 | 0.2 |
| 2356    | 0.4 | 2222    | 0.3 | 1828     | 0.6 |         |     | 1801    | 0.5 |         |     | 1851    | 0.6 | 1904    | 0.6 |
| 2 0501  | 0.6 | 17 0407 | 0.6 | 2 0126   | 0.3 | 17 0038 | 0.2 | 2 0109  | 0.2 | 17 0029 | 0.1 | 2 0056  | 0.2 | 17 0133 | 0.1 |
| 1146    | 0.3 | 1037    | 0.2 | 0627     | 0.5 | 0635    | 0.5 | 0619    | 0.4 | 0637    | 0.5 | 0721    | 0.5 | 0741    | 0.6 |
| SU 1808 | 0.7 | M 1745  | 0.7 | W 1225   | 0.2 | TH 1231 | 0.1 | TH 1203 | 0.2 | F 1226  | 0.1 | SU 1242 | 0.2 | M 1349  | 0.2 |
|         |     | 2337    | 0.3 | 1908     | 0.6 | 1912    | 0.6 | 1846    | 0.6 | 1854    | 0.6 | 1924    | 0.6 | 1939    | 0.6 |
| 3 0047  | 0.4 | 18 0527 | 0.6 | 3 0154   | 0.3 | 18 0131 | 0.1 | 3 0130  | 0.2 | 18 0117 | 0.1 | 3 0118  | 0.1 | 18 0207 | 0.1 |
| 0549    | 0.6 | 1139    | 0.1 | 0712     | 0.5 | 0727    | 0.5 | 0704    | 0.5 | 0722    | 0.5 | 0754    | 0.6 | 0814    | 0.6 |
| W 1218  | 0.3 | TU 1837 | 0.7 | TH 1251  | 0.2 | F 1324  | 0.1 | F 1235  | 0.2 | SA 1317 | 0.1 | M 1318  | 0.2 | TU 1428 | 0.2 |
| 1846    | 0.7 |         |     | 1945     | 0.7 | 1954    | 0.7 | 1923    | 0.6 | 1933    | 0.6 | 1954    | 0.6 | O 2012  | 0.6 |
| 4 0128  | 0.4 | 19 0041 | 0.2 | 4 0213   | 0.2 | 19 0218 | 0.1 | 4 0144  | 0.2 | 19 0159 | 0.1 | 4 0145  | 0.1 | 19 0238 | 0.1 |
| 0634    | 0.6 | 0630    | 0.6 | 0753     | 0.5 | 0811    | 0.5 | 0742    | 0.5 | 0800    | 0.6 | 0824    | 0.6 | 0847    | 0.7 |
| 1242    | 0.3 | W 1236  | 0.1 | F 1319   | 0.2 | SA 1411 | 0.1 | SA 1305 | 0.2 | SU 1402 | 0.1 | TU 1357 | 0.2 | W 1504  | 0.2 |
| 1923    | 0.7 | 1923    | 0.7 | 2020     | 0.7 | O 2033  | 0.7 | 1957    | 0.6 | 2009    | 0.7 | 2021    | 0.6 | 2047    | 0.6 |
| 5 0159  | 0.3 | 20 0137 | 0.2 | 5 0230   | 0.2 | 20 0300 | 0.1 | 5 0159  | 0.2 | 20 0237 | 0.0 | 5 0218  | 0.1 | 20 0305 | 0.1 |
| 0717    | 0.6 | 0725    | 0.6 | 0830     | 0.5 | 0853    | 0.6 | 0816    | 0.5 | 0835    | 0.6 | 0853    | 0.6 | 0922    | 0.7 |
| W 1304  | 0.2 | TH 1328 | 0.1 | SA 1350  | 0.2 | SU 1456 | 0.1 | SU 1337 | 0.1 | M 1443  | 0.1 | W 1437  | 0.1 | TH 1538 | 0.2 |
| 2000    | 0.8 | 2007    | 0.8 | 2052     | 0.7 | 2110    | 0.7 | 2027    | 0.6 | O 2043  | 0.7 | 2047    | 0.6 | 2123    | 0.6 |
| 6 0225  | 0.3 | 21 0229 | 0.2 | 6 0252   | 0.2 | 21 0341 | 0.1 | 6 0221  | 0.1 | 21 0312 | 0.0 | 6 0254  | 0.0 | 21 0330 | 0.1 |
| 0758    | 0.6 | 0815    | 0.6 | 0904     | 0.6 | 0933    | 0.6 | 0846    | 0.6 | 0910    | 0.6 | 0923    | 0.6 | 0959    | 0.7 |
| 1330    | 0.2 | F 1418  | 0.1 | SU 1425  | 0.2 | M 1538  | 0.1 | M 1412  | 0.1 | TU 1521 | 0.1 | TH 1520 | 0.1 | F 1613  | 0.2 |
| 2036    | 0.8 | O 2050  | 0.8 | 2122     | 0.7 | 2146    | 0.7 | 2053    | 0.7 | 2117    | 0.7 | 2117    | 0.6 | 2201    | 0.6 |
| 7 0249  | 0.3 | 22 0317 | 0.1 | 7 0319   | 0.2 | 22 0420 | 0.1 | 7 0249  | 0.1 | 22 0344 | 0.1 | 7 0333  | 0.0 | 22 0355 | 0.1 |
| 0838    | 0.6 | 0903    | 0.6 | 0935     | 0.6 | 1013    | 0.6 | 0915    | 0.6 | 0946    | 0.6 | 0957    | 0.6 | 1040    | 0.7 |
| 1401    | 0.2 | SA 1506 | 0.1 | M 1502   | 0.2 | TU 1618 | 0.1 | TU 1450 | 0.1 | W 1557  | 0.1 | F 1606  | 0.1 | SA 1649 | 0.2 |
| 2111    | 0.8 | 2131    | 0.8 | 2148     | 0.7 | 2223    | 0.7 | 2117    | 0.7 | 2152    | 0.6 | 2151    | 0.6 | 2244    | 0.5 |
| 8 0315  | 0.3 | 23 0405 | 0.1 | 8 0351   | 0.2 | 23 0457 | 0.1 | 8 0322  | 0.1 | 23 0413 | 0.1 | 8 0415  | 0.0 | 23 0423 | 0.1 |
| 0915    | 0.6 | 0950    | 0.6 | 1005     | 0.6 | 1054    | 0.6 | 0942    | 0.6 | 1025    | 0.6 | 1037    | 0.6 | 1125    | 0.6 |
| W 1436  | 0.2 | SU 1552 | 0.1 | TU 1542  | 0.2 | W 1658  | 0.2 | W 1530  | 0.1 | TH 1633 | 0.1 | SA 1657 | 0.1 | SU 1730 | 0.2 |
| 2145    | 0.8 | 2212    | 0.8 | 2212     | 0.7 | 2301    | 0.6 | 2141    | 0.6 | 2229    | 0.6 | 2231    | 0.5 | 2331    | 0.5 |
| 9 0345  | 0.3 | 24 0451 | 0.1 | 9 0427   | 0.1 | 24 0534 | 0.1 | 9 0358  | 0.1 | 24 0441 | 0.1 | 9 0501  | 0.1 | 24 0457 | 0.2 |
| 0954    | 0.6 | 1037    | 0.6 | 1036     | 0.6 | 1139    | 0.6 | 1013    | 0.6 | 1106    | 0.6 | 1123    | 0.6 | 1215    | 0.6 |
| SU 1515 | 0.2 | M 1639  | 0.2 | W 1624   | 0.2 | TH 1739 | 0.2 | TH 1613 | 0.1 | F 1709  | 0.2 | SU 1755 | 0.2 | M 1820  | 0.2 |
| 2217    | 0.8 | 2254    | 0.7 | 2236     | 0.7 | 2341    | 0.6 | 2209    | 0.6 | 2309    | 0.5 | 2319    | 0.5 |         |     |
| 10 0420 | 0.3 | 25 0538 | 0.2 | 10 0507  | 0.1 | 25 0609 | 0.2 | 10 0438 | 0.1 | 25 0508 | 0.1 | 10 0553 | 0.1 | 25 0030 | 0.4 |
| 1030    | 0.6 | 1127    | 0.6 | 1112     | 0.6 | 1230    | 0.5 | 1049    | 0.6 | 1152    | 0.6 | 1221    | 0.6 | 0537    | 0.2 |
| W 1555  | 0.2 | TU 1726 | 0.2 | TH 1711  | 0.2 | F 1824  | 0.3 | F 1700  | 0.1 | SA 1750 | 0.2 | M 1907  | 0.2 | TU 1314 | 0.6 |
| 2246    | 0.8 | 2336    | 0.7 | 2307     | 0.6 |         |     | 2243    | 0.6 | 2354    | 0.5 |         |     | 1924    | 0.3 |
| 11 0459 | 0.3 | 26 0627 | 0.2 | 11 0552  | 0.1 | 26 0027 | 0.5 | 11 0522 | 0.1 | 26 0537 | 0.2 | 11 0024 | 0.4 | 26 0147 | 0.4 |
| 1108    | 0.6 | 1220    | 0.6 | 1157     | 0.6 | 0645    | 0.2 | 1133    | 0.6 | 1246    | 0.5 | 0658    | 0.2 | 0626    | 0.2 |
| 1640    | 0.3 | W 1817  | 0.3 | F 1804   | 0.2 | SA 1330 | 0.5 | SA 1754 | 0.2 | SU 1843 | 0.2 | TU 1340 | 0.5 | W 1420  | 0.6 |
| 2314    | 0.7 |         |     | 2345     | 0.6 | 1930    | 0.3 | 2324    | 0.5 |         |     | 2033    | 0.2 | 2046    | 0.3 |
| 12 0542 | 0.3 | 27 0022 | 0.7 | 12 0643  | 0.1 | 27 0124 | 0.5 | 12 0612 | 0.1 | 27 0051 | 0.4 | 12 0219 | 0.4 | 27 0313 | 0.4 |
| 1151    | 0.6 | 0717    | 0.2 | 1300     | 0.5 | 0729    | 0.2 | 1230    | 0.5 | 0614    | 0.2 | 0824    | 0.2 | 0731    | 0.3 |
| W 1728  | 0.3 | TH 1320 | 0.6 | SA 1910  | 0.3 | SU 1443 | 0.5 | SU 1901 | 0.2 | M 1354  | 0.5 | W 1517  | 0.5 | TH 1529 | 0.6 |
| 2344    | 0.7 | 1918    | 0.3 |          |     | 2130    | 0.3 |         |     | 2014    | 0.3 | 2201    | 0.2 | 2203    | 0.3 |
| 13 0630 | 0.3 | 28 0113 | 0.6 | 13 0035  | 0.5 | 28 0242 | 0.4 | 13 0016 | 0.5 | 28 0212 | 0.4 | 13 0421 | 0.4 | 28 0428 | 0.4 |
| 1248    | 0.6 | 0813    | 0.2 | 0744     | 0.2 | 0840    | 0.2 | 0714    | 0.1 | 0704    | 0.2 | 0956    | 0.2 | 0854    | 0.3 |
| 1825    | 0.3 | F 1428  | 0.5 | SU 1433  | 0.5 | M 1600  | 0.5 | M 1355  | 0.5 | TU 1510 | 0.5 | TH 1638 | 0.5 | F 1631  | 0.6 |
|         |     | 2042    | 0.4 | 2035     | 0.3 | 2325    | 0.3 | 2030    | 0.2 | 2229    | 0.3 | 2314    | 0.2 | 2251    | 0.3 |
| 14 0623 | 0.7 | 29 0212 | 0.5 | 14 0149  | 0.5 | 29 0409 | 0.4 | 14 0141 | 0.4 | 29 0345 | 0.4 | 14 0537 | 0.4 | 29 0527 | 0.5 |
| 0724    | 0.3 | 0915    | 0.3 | 0859     | 0.2 | 1014    | 0.2 | 0836    | 0.2 | 0824    | 0.3 | 1114    | 0.2 | 1016    | 0.3 |
| W 1407  | 0.6 | SA 1540 | 0.5 | M 1614   | 0.5 | TU 1708 | 0.5 | TU 1545 | 0.5 | W 1623  | 0.5 | F 1739  | 0.6 | SA 1722 | 0.6 |
| 1934    | 0.4 | 2220    | 0.4 | 2212     | 0.3 |         |     | 2209    | 0.2 | 2346    | 0.2 |         |     | 2326    | 0.2 |
| 15 0717 | 0.6 | 30 0322 | 0.5 | 15 0354  | 0.4 |         |     | 15 0411 | 0.4 | 30 0502 | 0.4 | 15 0009 | 0.1 | 30 0613 | 0.5 |
| 0825    | 0.2 | 1017    | 0.3 | 1018     | 0.1 |         |     | 1007    | 0.2 | 1013    | 0.3 | 0628    | 0.5 | 1118    | 0.3 |
| W 1533  | 0.6 | SU 1646 | 0.6 | TU 1728  | 0.6 |         |     | W 1708  | 0.5 | TH 1723 | 0.5 | SA 1215 | 0.2 | SU 1805 | 0.6 |
| 2056    | 0.4 | 2344    | 0.4 | 2334     | 0.2 |         |     | 2329    | 0.2 |         |     | 1825    | 0.6 | 2358    | 0.2 |
|         |     |         |     |          |     |         |     |         |     |         |     |         |     |         |     |
|         |     | 31 0433 | 0.5 |          |     |         |     | 31 0021 | 0.2 |         |     |         |     |         |     |
|         |     | 1111    | 0.2 |          |     |         |     | 0600    | 0.4 |         |     |         |     |         |     |
|         |     | M 1742  | 0.6 |          |     |         |     | F 1121  | 0.3 |         |     |         |     |         |     |
|         |     |         |     |          |     |         |     | 1811    | 0.6 |         |     |         |     |         |     |



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





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

**CERTIFICATE OF COMPETENCY EXAMINATION**

GRADE : OFFICER IN CHARGE OF A NAVIGATIONAL WATCH ON SHIPS OF  
LESS THAN 500 GT (NCV)  
SUBJECT : GENERAL SHIP KNOWLEDGE  
DATE : 11<sup>st</sup> August 2014,

Time allowed THREE hours

Total marks : 200

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 required.

**SECTION - I**

1) Write short notes on the following:

- a) ISM Code
- b) IMDG Code
- c) Light displacement
- d) Reserve buoyancy
- e) Metacentric height

(05 marks each)

2) A ship displaces 4950 t and has KG 4.85 m, KM 5.79 m. Cargo weighing 50 t is loaded 1.25 m above the keel and 4 m to port of the centre line. Find the final list.

(25 marks)

3) a) With the aid of diagrams explain the following:

- i) stable equilibrium
- ii) unstable equilibrium

(10 marks each)

b) List the corrective actions to be taken if a vessel is in angle of loll.

(05 marks)

4) a) How do you prepare a vessel for anticipated heavy weather at sea?

(10 marks)

b) List the precautions to be taken before loading a heavy lift.

(10 marks)

c) What are the occasions that you replace a wire of a cargo lifting gear?

(05 marks)



Answers

Question – 5

$$\text{Initial GM} = 5.79 - 4.85 = 0.94 \text{ m}$$

05 marks

After loading,

$$\begin{aligned} GG_1 \downarrow &= w \times d / W \\ &= 50 \times (4.85 - 1.25) / (4950 + 50) \\ &= 0.036 \text{ m} \end{aligned}$$

Therefore,

$$\begin{aligned} \text{Final GM} &= 0.94 + 0.036 \text{ m} \\ &= 0.976 \text{ m} \end{aligned}$$

10 marks

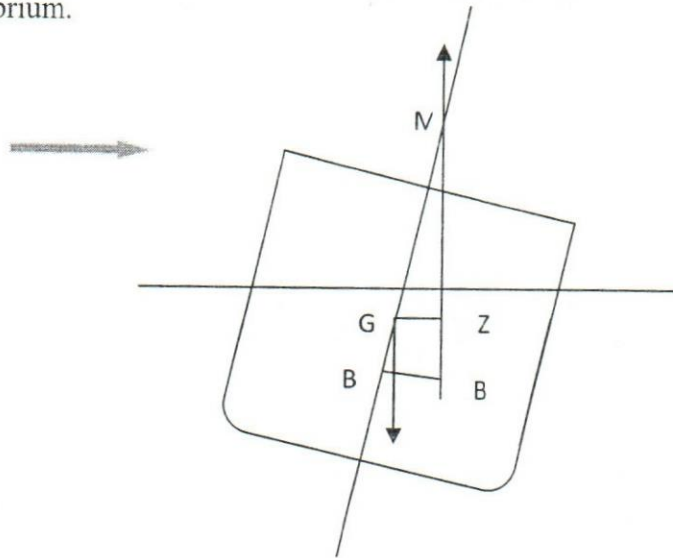
To calculate the list,

$$\begin{aligned} \tan \theta &= w \times d / (W \times \text{GM}) \\ &= 50 \times 4 / (5000 \times 0.976) \\ \theta &= 2.35^\circ \text{ (port side)} \end{aligned}$$

10 marks

**Question 3(a)(i)**

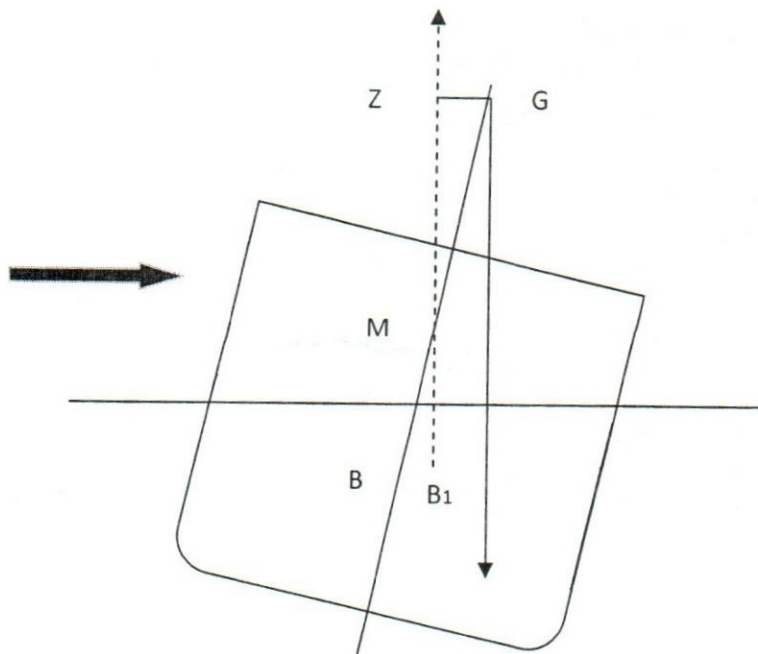
When a vessel is heeled by an external force, if there is a tendency of the vessel to come back to the upright position again, the vessel is said to be in 'stable equilibrium'. When the position of 'M' is above the position of 'G' (i.e. when the vessel is having a +GM), she is in a stable equilibrium.



In the above diagram, the 'couple' acts towards upright position when heeled. Therefore, she is in a stable equilibrium.

10 marks

**Question 3(a)(ii)**





In the above diagram, the position of 'M' is below the position 'G' (i.e. she is having a negative GM). When the vessel is heeled, the 'couple' also acts towards the same direction without coming to the upright position. Therefore, once the external force is removed, the vessel will heel further. The above vessel is said to have an '**unstable equilibrium**'. The GZ is known as capsizing lever and the moment ( $W \times GZ$ ) is called as capsizing moment, but she does not necessarily capsize when she has a negative GM. This will be discussed in detail below.

10 marks

**Question - 3(b)**

- add weights below 'G' (in lower holds, double bottom tanks),
- discharge weights which are already above 'G',
- transfer of weights downwards,
- remove free surface effects in tanks.

05 marks

**Question - 4(a)**

- a) Make sure to follow the heavy weather check list.
- b) Verify vessels position and consider re-routeing
- c) Avoid slack tanks and eliminate free surface.
- d) If required consider about changing the trim.
- e) Rig life lines Fwd and Aft
- f) Warn all departments of heavy weather
- g) Close all hatches, ventilations and man holes, fore-castle stores etc
- h) Ensure the cargo lashings are all right.
- i) Check deck securing, anchors, life-boats, water-tight doors
- j) Secure all derricks and cranes
- k) Batten down all dead lights
- l) Clear all deck of surplus gear
- m) Slack the signal and flag halyards
- n) Establish heavy weather work routine
- o) Check securing on accommodation ladder
- p) Secure bridge against heavy rolling/pitching
- q) Reduce speed in ample time to avoid pounding
- r) Organise meal relief's and watches
- s) Ensure the LSA equipment are in appropriate positions.
- t) Note all preparation in the Log Book
- u) Engage manual steering in ample time
- v) Revise ETA if appropriate.

- w) During heavy weather try to avoid beam swell/wave (may cause rolling synchronization), head swell/wave (may cause heavy pitching, panting and pounding) and stern swell/wave (may cause pooping)

10 marks

**Question – 4(b)**

- a) ensure the load density is sufficient
- b) If the load density is insufficient, place dunnage.
- c) Select an appropriate place with sufficient lashing points. Ensure the securing points are strong enough for lashing this cargo by referring in to cargo securing manual.
- d) Calculate GM for,
  - critical stage (just after the weight is taken by the derrick)
  - after loading
- e) Minimize free surface effect by emptying or filling the tanks completely.
- f) Keep the vessel upright.
- g) Stop all other cargo operations.
- h) Inform heads of departments.
- i) Un-authorized persons are not to be allowed.
- j) Ensure the gangway is up and the moorings are tight.
- k) Cast of barges if moored along side.
- l) Lash all loose items.
- m) Lay up dunnage in the fore & aft direction or diagonally. So that the weight will be spread over the transverse beams and frames.
- n) Attach steadying lines to the weight (to control the movement of cargo during loading).
- o) Just after the weight is taken by the derrick, check the cargo slings and wires.

10 marks

**Question – 4(c)**

- a) If it is crushed
- b) If it is chaffed
- c) If it is corroded
- d) If anyone strand is completely broken
- e) If more than 10% of strands are broken in a length of eight diameters in any place of the rope.

05 marks





## SECTION - II

Answer all questions. Every question carries 04 marks

Choose the correct answer from the answers given or brief answers to be provided or fill in the blanks as appropriate

---

- 1) During steering gear testing rudder shall move from hard over to hard over,
  - a) within 20 seconds with two steering motors on
  - b) within 20 seconds with one steering motor on
  - c) within 28 seconds with one steering motor on
  - d) within 28 seconds with two steering motors on
  
- 2) A position obtained by a GPS is accurate up to,
  - a) 100 m
  - b) 10 m
  - c) 90 m
  - d) 95 m
  
- 3) SVDR (Simplified Voyage Data Recorder) is used to,
  - a) monitor the ship's speed
  - b) record activities in the bridge
  - c) record machinery space oil discharges
  - d) pump room oil discharges
  
- 4) The index error of the sextant has to be verified only when,
  - a) the sextant is serviced
  - b) every time an observation is made
  - c) the corrections are made using the adjustment screws
  - d) the collimation error is corrected
  
- 5) When a vessel is experiencing squat effect,
  - a) her steering will be sluggish
  - b) she will experience a virtual increase in draught
  - c) she may experience excessive vibrations
  - d) all of above
  
- 6) cumulative list of Admiralty Notices to Mariners published once,
  - a) every six months
  - b) every month
  - c) every three months
  - d) every year

7) Briefly explain the dangerous quadrant of a TRS (Tropical Revolving Storm).

.....  
.....  
.....  
.....

8) The atmosphere above us is divided into different layers on the basis of the height from the Earth's surface. They are,

- a) .....
- b) .....
- c) .....
- d) .....

9) The best medium to extinguish an electrical fire is,

- a) water
- b) foam
- c) dry powder
- d) CO<sub>2</sub>

10) When wind is present, a line throwing apparatus shall be fired,

- a) directly towards the target
- b) towards the wind
- c) away from the wind
- d) none of above

11) A tender vessel means,

- a) a vessel with a zero GM
- b) a vessel with a large GM
- c) a vessel with a small GM
- d) an unseaworthy vessel

12) Due to the FSE (Free Surface Effect) a vessel may experience,

- a) a list
- b) an increase in GM
- c) severe pitching
- d) a virtual loss of GM

13) During loading operations, the COG (Centre Of Gravity) of a vessel moves .....  
the weight loaded





14) With reference to bulk cargo, when the angle of repose is less,

- a) the cargo is liable to shift easily
- b) the cargo is liable to topple over
- c) the cargo is liable to evaporate
- d) the cargo is liable to liquefy

15) Coal cargo is liable to,

- a) emit sulphur
- b) emit methane
- c) spontaneous combustions
- d) all of above

16) IMDG Code is applicable for,

- a) noxious liquid substances carried in bulk
- b) noxious liquid substances carried in package form
- c) oil cargoes
- d) none of above

17) Segregation method 'away from' requires a hazardous commodity to be placed on board as follows,

.....  
.....  
.....  
.....

18) The O<sub>2</sub> content in cargo oil tanks during loading/discharging operations shall be ..... or less.

19) MARPOL 73/78 applies to all tankers of ..... GT or more and to all other vessels of ..... GT and above.

20) ISPS defines ..... security levels.

21) Name four types of lashing materials used in securing containers

- a) .....
- b) .....
- c) .....
- d) .....

22) Briefly explain the effect of discharging ballast water in a coast different from the ballasted country.

.....  
.....  
.....

23) Briefly explain the purpose of PSC (Port State Control) inspections.

.....  
.....  
.....  
.....

24) Briefly explain the duties of an OOW during port watchkeeping

.....  
.....  
.....  
.....

25) List four instructions that you (as OOW) may give to the gangway watch keeper while the vessel is in a port.

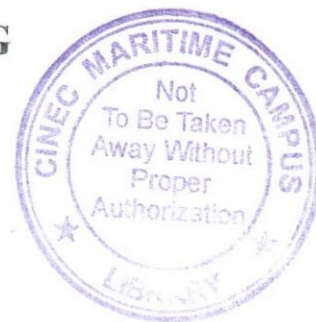
- a) .....
- b) .....
- c) .....
- d) .....





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

**CERTIFICATE OF COMPETENCY EXAMINATION**



GRADE : MASTER ON SHIPS OF LESS THAN 500 GT (NCV)  
SUBJECT : GENERAL SHIP KNOWLEDGE  
DATE : 11<sup>st</sup> August 2014,

---

|                          |                   |
|--------------------------|-------------------|
| Time allowed THREE hours | Total marks : 200 |
| 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 required.

**SECTION - I**

1) Answer the following questions with reference to bills of lading:

a) Briefly explain the purpose of a bill of lading.

(10 marks)

b) List the items that you would check on a bill of lading when presented it for your signature.

(10 marks)

c) Describe the procedure of delivering cargo at the port of discharge.

(05 marks)

2) On a ship of 2000 t displacement and KG 3.66 m, carries out following operations

loads 1500 t (KG 5.5 m) cargo

loads 3500 t (KG 4.6 m) cargo

loads 1520 t (KG 0.6 m) bunkers

discharges 2000 t (KG 2.44 m) cargo

consumes 900 t of bunkers (KG 0.40 m) during the voyage

Find the KG at the end of the voyage

(25 marks)

3) Write short notes on the following:

a) ISPS Code

b) SOLAS

c) Angle of loll

d) BIMMS Agreement

e) Squat effect

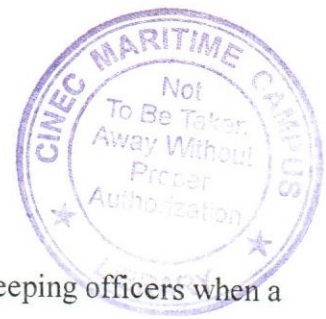
(05 marks each)

4) a) List the approaching signs of a TRS.

(10 marks)

b) What are the preparations and precautions you would take if you suspect a TRS in the vicinity?

(15 marks)



## SECTION II

- 1) a) What instructions/orders you would like to give to your watchkeeping officers when a vessel is at port carrying out cargo operations?  
(10 marks)
- b) What instructions/orders you would like to give to your watchkeeping officers during sea a passage?  
(10 marks)
- 2) a) List the items that could be included in to a contingency plan in the event of vessel grounding.  
(10 marks)
- b) State the actions that you would take in case of a collision with another vessel?  
(10 marks)
- 3) a) Explain the permit to work system comes under ISM, used on board vessels  
(10 marks)
- b) Propose a check list for entry into an enclosed space  
(10 marks)
- 4) a) List the precautions you have to take when loading a package of dangerous cargo.  
(10 marks)
- b) What actions would you take if you find an IMDG cargo leaking which is onboard?  
(05 marks)
- c) List the documents required to have on board when carrying IMDG cargoes.  
(05 arks)
- 5) a) What actions you would take in case of man over board?  
(10 marks)
- b) List the actions to be taken when lowering a gravity launch life boat.  
(10 marks)



**SECTION II**

Answer all questions.

Each question carries 04 marks.

---

- 1) Angle of loll occurs when;
  - a) the initial GM is negative
  - b) the initial GM is positive
  - c) the initial GM zero
  - d) non of the above
  
- 2) A stiff ship is a vessel having a;
  - a) Small GM
  - b) Higher draught
  - c) Large GM
  - d) Low free board
  
- 3) Centre of buoyancy is at the ..... of the underwater volume.
  
- 4) Duration of a tide means .....
  
- 5) A radar equipment works on the principle of .....
  
- 6) Explain the meaning of deviation and how it occurs .....
  
- 7) Select the most correct statement in relation to chart correction;
  - a) First write the correction number on the chart & then correct the chart
  - b) First write the correction on the correction log, then write on the chart and then correct the chart
  - c) First correct the chart and then enter the number at the bottom of the chart
  - d) Chart correction shall be done in black colour
  
- 8) How do you obtain the pressure at the sea level?  
.....  
.....  
.....

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



**CERTIFICATE OF COMPETENCY EXAMINATION**

GRADE : OFFICER IN CHARGE OF A NAVIGATIONAL WATCH ON SHIPS OF  
LESS THAN 500 GT (NCV)  
SUBJECT : GENERAL SHIP KNOWLEDGE  
DATE : 31<sup>st</sup> April 2014,

Time allowed THREE hours

Total marks : 200

Answer all questions

Pass marks : 50%

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

**SECTION I**

- 1) Write short notes on the following:
- SOLAS
  - MARPOL 73/78 as amended
  - Deadweight
  - Angle of loll
  - Plimsolls Mark

(05 marks each)

- 2) A ship displaces 7500 m<sup>3</sup> of salt water of relative density 1.025 when floating at sea. Find the displacement in tonnes when the ship is floating at the same draught in water of relative density 1.015.

(20 marks)

- 3) A vessel displaces 5800 tonnes. Her KM is 7.0 m and KG is 6.0 m. She has to complete loading to end up with a GM of 0.75 m. The load has to be placed at a KG of 11.0 m. Find the quantity of cargo to be loaded.

(25 marks)

- 4) Sketch an outline of strengthening arrangements in the forward area of a vessel. Explain why these arrangements are necessary.

(25 marks)

- d) .....
- 18) Life jackets shall be marked with ..... and .....
- 19) Foam is more suitable to extinguish .....fires.
- 20) What are the machinery space bilges discharge regulations in outside special area from a tanker of 150 GT or more according to MARPOL?  
a) .....  
b) .....  
c) .....  
d) .....
- 21) According to the MARPOL Annex V, dry cargo residues which are not harmful for the marine environment may be discharged ..... nautical miles away from the nearest land.
- 22) Certificates issued under STCW 95 may be used until .....
- 23) Briefly describe about the Maritime Labour Convention (MLC) 2006.  
.....  
.....  
.....  
.....
- 24) List four precautions to be taken when entering in to an enclosed space.  
a) .....  
b) .....  
c) .....  
d) .....
- 25) What will you do if you find a leaking IMDG container on deck?  
.....  
.....  
.....  
.....





- 9) With regards to a TRS wind backing means,  
.....  
.....
- 10) List the precautions to be taken while taking bunkers onboard.  
a) .....  
b) .....  
c) .....  
d) .....
- 11) A Ship's docking plan provides,  
a) .....  
b) .....  
c) .....  
d) .....
- 12) List four precautions to be taken while docking a ship.  
a) .....  
b) .....  
c) .....  
d) .....
- 13) Certain types of coal are dangerous because they emits ..... Gas.
- 14) Cargo sweat occurs when .....  
.....
- 15) Dunnages can be used to;  
a) spread the weight of a cargo  
b) keep spaces between cargoes for ventilation purposes  
c) separate and secure cargo  
d) all of above
- 16) A hydrometer is used to measure the .....
- 17) List four actions to be taken in preparing a vessel for heavy weather.  
a) .....  
b) .....  
c) .....

The main feature of fore peak structure is the strengthening against panting and pounding stresses. In order to overcome panting stress the panting beams, panting stringers and the breast hooks are used. Panting stringers are triangular plates bordering the tank horizontally of two or three levels. Breast hooks are smaller horizontal triangular plates fitted in between panting stringers to give additional strength to the stem plate. Panting beams are T shaped stiffeners fitted transverse direction connecting the panting stringers and shell plating.

(07 marks)

Pounding stress which acts on the bottom of the fore peak structure is counteracted by having solid floors fitted at each frame space.

Centerline wash plate is fitted in the middle of the tank and also gives the longitudinal strength.

The side shell plating is strengthened by either longitudinal or transverse framing as per the framing system used. To provide additional strength, the frame spacing is reduced in the forepeak structure.

(06 marks)



### Answers

#### Question 2

Displacement in seawater = 7500 t

Displacement in DW at the same draught =  $7500 \times 1.015 / 1.025$   
= 7426.8 t

#### Question 3

Initial GM =  $7 - 6 \text{ m} = 1.0 \text{ m}$

Final GM = 0.75 m

Therefore,

$GG_1 \uparrow = 1 - 0.75 \text{ m} = 0.25 \text{ m}$

Since,

$GG_1 = w \times d / W$

$0.25 = w \times (11 - 6) / (5800 + w)$

$w = 305.3 \text{ t}$

305.3 t has to be loaded to end up with a GM of 0.75 m

#### Question 4

The sketch shall show the following;

Upper most continues deck, deck beam, deck girders, store spacing, panting beams, panting stringers, breast hooks, stem plate, centre wash plate, solid floors, collision bulk head, chain locker.

(12 marks)

The forepeak is bounded by collision bulk head at after end, port and stbd shell plating at sides and stem plate at forward end. The side shell plating are connected to the stem plate by the use of butt weld on either side (soft nose).



Ministry  
Management

CLASS IV  
masters.

**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 : 11<sup>st</sup> August 2014,

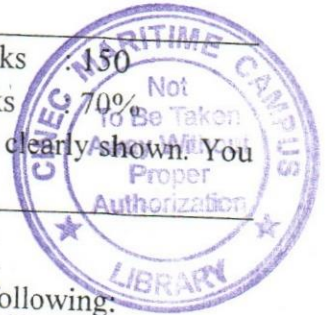
Time allowed THREE hours

Total marks 150

Answer all questions

Pass marks 70%  
Not To Be Taken  
Without Proper  
Authorization

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



- 1) Sketch/Write and show the chart symbols as per the BA 5011 for the following:
  - a) Precautionary area
  - b) Nature of sea bed Sand and Mud
  - c) A light fitted with a Racon and having an occulting red light shown to a distance of eight miles
  - d) Doubtful depth of 22 m
  - e) Established direction of traffic flow

(05 marks each)
- 2) Find the earliest time on 23<sup>rd</sup> May 2000 to cross a bar at Cochin, with a draft of 3.8 m. Vessel is required to have an under keel clearance of 0.8 m at the bar for safe passing, which has a charted depth of 4.0 m.

(25 marks)
- 3) At 1000 hrs on 1<sup>st</sup> August your vessel was at a position Dorawa Point bearing  $312^{\circ}(\text{G}) \times 10'$ . You are required to proceed to a position Galbokka Light bearing  $092^{\circ}(\text{G}) \times 5'$ . Your vessel can steam at 14 knots. The gyro compass has an error of  $2^{\circ}(\text{H})$ . Answer the following questions with reference to this passage.
  - a) Find the position of the vessel at 1000 hrs

(05 marks)
  - b) Plan a passage from the 1000 hrs position to the position mentioned above. Your answer shall include all the safety aspects of passage planning.

(25 marks)
  - c) She is expected to experience a current of  $040^{\circ}(\text{T})$  at a rate of 4.0 knots between 1000 hrs position and the point of entry in to the TSS. Calculate the gyro compass course to steer between these two positions.

(15 marks)

d) Calculate the ETA off Galbokka Light considering the effect of the current during the first leg.

(10 marks)

4) At 0600 hrs on 05<sup>th</sup> of July, a vessel observed the following horizontal sextant angles:

Between Dondra Head Light and Weligama Light -  $035^{\circ}$

Between Weligama Light and Point de Galle Light -  $057^{\circ}$

Find the position of the vessel at the time of the observation.

(20 marks)

5) a) List the factors which affect the position fixing frequency.

(05 marks)

b) State the factors to be considered when choosing an area for anchoring, as part of a Voyage Plan

(10 marks)

c) state the orders that you would like to give to your OOW when expecting restricted visibility during a passage.

(10 marks)

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

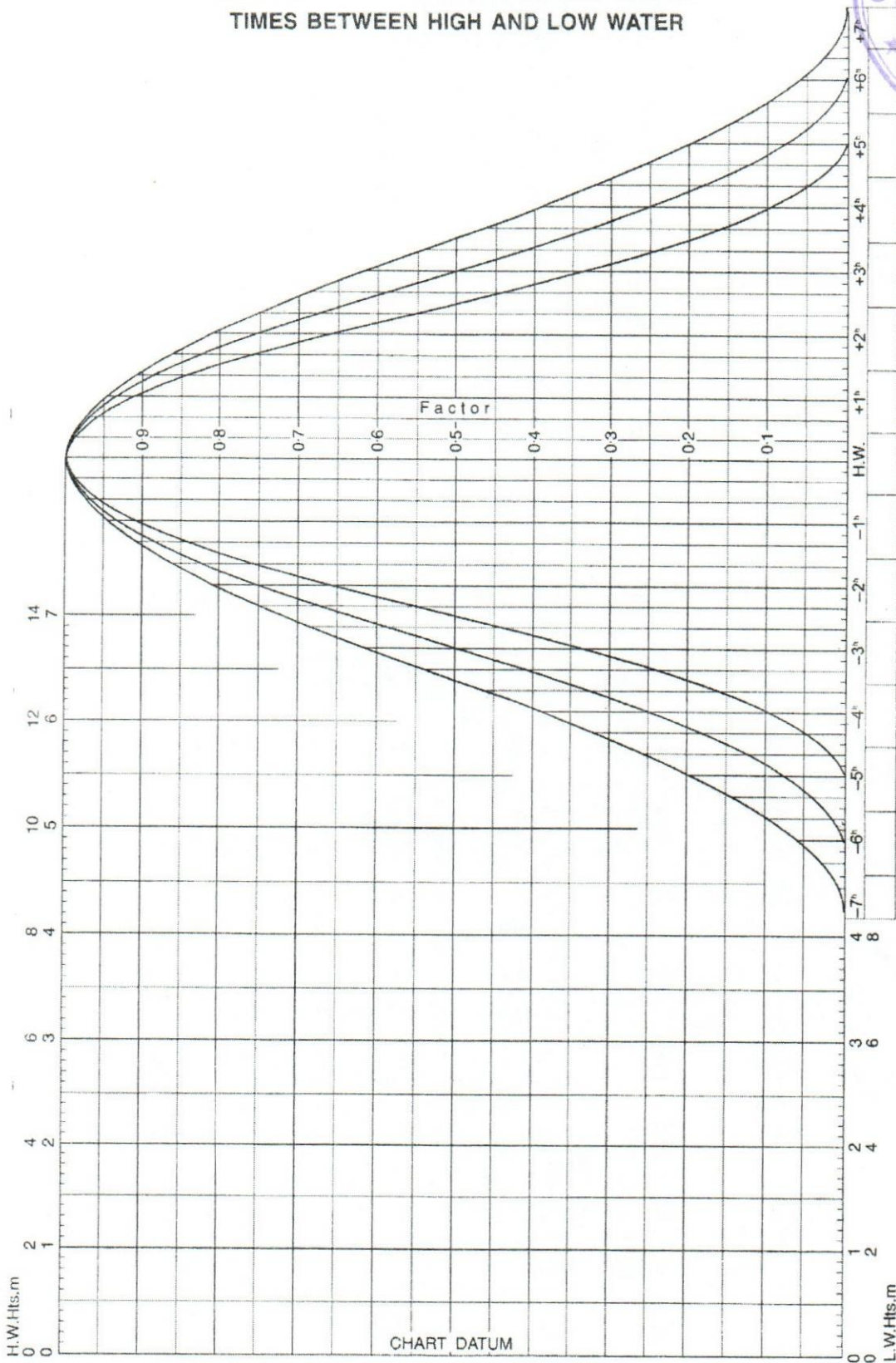
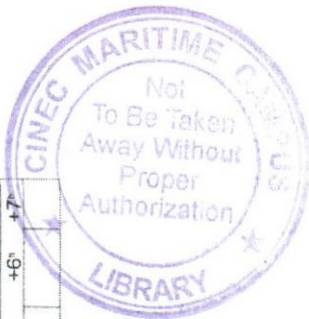


CHART DATUM



# INDIA WEST COAST - COCHIN

LAT 9°58'N LONG 76°16'E

TIME ZONE -0530

TIMES AND HEIGHTS OF HIGH AND LOW WATERS

YEAR 200

| MAY            |     |                |     | JUNE           |      |                |     | JULY           |      |                |     | AUGUST         |       |                |       |
|----------------|-----|----------------|-----|----------------|------|----------------|-----|----------------|------|----------------|-----|----------------|-------|----------------|-------|
| Time           | m   | Time           | m   | Time           | m    | Time           | m   | Time           | m    | Time           | m   | Time           | m     | Time           |       |
| <b>1</b> 0413  | 0.3 | <b>16</b> 0446 | 0.1 | <b>1</b> 0430  | 0.0  | <b>16</b> 0520 | 0.0 | <b>1</b> 0443  | -0.1 | <b>16</b> 0526 | 0.1 | <b>1</b> 0604  | 0.0   | <b>16</b> 0618 | 0.618 |
| 1022           | 0.7 | 1204           | 0.8 | 1205           | 0.8  | 1314           | 0.9 | 1239           | 0.9  | 1325           | 0.9 | 1338           | 0.9   | 1331           | 1.341 |
| M 1555         | 0.4 | TU 1719        | 0.5 | TH 1716        | 0.5  | F 1829         | 0.5 | SA 1754        | 0.5  | SU 1851        | 0.5 | TU 1919        | 0.4   | W 1929         | 1.929 |
| 2204           | 0.8 | 2230           | 0.8 | 2211           | 0.8  | 2248           | 0.7 | 2226           | 0.7  | O 2307         | 0.6 |                |       |                |       |
| <b>2</b> 0443  | 0.3 | <b>17</b> 0522 | 0.1 | <b>2</b> 0513  | -0.1 | <b>17</b> 0553 | 0.0 | <b>2</b> 0530  | -0.1 | <b>17</b> 0600 | 0.1 | <b>2</b> 0048  | 0.7   | <b>17</b> 0037 | 0.037 |
| 1128           | 0.8 | 1249           | 0.9 | 1254           | 0.9  | 1348           | 0.9 | 1323           | 0.9  | 1353           | 0.9 | 0651           | 0.1   | 0652           | 0.652 |
| TU 1651        | 0.4 | W 1805         | 0.5 | F 1807         | 0.5  | SA 1908        | 0.5 | SU 1845        | 0.5  | M 1927         | 0.5 | W 1416         | 0.0   | TH 1400        | 1.400 |
| 2236           | 0.6 | 2305           | 0.8 | ● 2254         | 0.8  | O 2328         | 0.7 | ● 2329         | 0.7  | 2355           | 0.6 | 2003           | 0.3   | 1955           | 1.955 |
| <b>3</b> 0515  | 0.2 | <b>18</b> 0555 | 0.1 | <b>3</b> 0555  | -0.1 | <b>18</b> 0624 | 0.0 | <b>3</b> 0617  | -0.1 | <b>18</b> 0633 | 0.1 | <b>3</b> 0152  | 0.7   | <b>18</b> 0124 | 0.124 |
| 1220           | 0.8 | 1329           | 0.9 | 1340           | 0.9  | 1419           | 0.9 | 1405           | 1.0  | 1418           | 0.9 | 0738           | 0.1   | 0724           | 0.724 |
| W 1740         | 0.4 | TH 1845        | 0.5 | SA 1857        | 0.5  | SU 1944        | 0.5 | M 1935         | 0.4  | TU 2000        | 0.4 | TH 1452        | 0.9   | F 1419         | 1.419 |
| 2307           | 0.8 | O 2336         | 0.7 | 2341           | 0.8  |                |     |                |      |                |     | 2047           | 0.2   | 2021           | 2.021 |
| <b>4</b> 0550  | 0.1 | <b>19</b> 0625 | 0.1 | <b>4</b> 0638  | -0.1 | <b>19</b> 0008 | 0.7 | <b>4</b> 0034  | 0.7  | <b>19</b> 0043 | 0.6 | <b>4</b> 0255  | 0.7   | <b>19</b> 0211 | 0.211 |
| 1308           | 0.9 | 1405           | 0.9 | 1425           | 1.0  | 0653           | 0.1 | 0703           | -0.1 | 0704           | 0.1 | 0824           | 0.2   | 0757           | 0.757 |
| TH 1826        | 0.4 | F 1920         | 0.5 | SU 1947        | 0.5  | M 1448         | 0.9 | TU 1446        | 0.9  | W 1441         | 0.9 | F 1527         | 0.9   | SA 1440        | 1.440 |
| ● 2339         | 0.8 |                |     |                |      | 2020           | 0.5 | 2024           | 0.4  | 2030           | 0.4 | 2133           | 0.2   | 2047           | 2.047 |
| <b>5</b> 0627  | 0.0 | <b>20</b> 0005 | 0.7 | <b>5</b> 0032  | 0.7  | <b>20</b> 0052 | 0.6 | <b>5</b> 0141  | 0.7  | <b>20</b> 0131 | 0.7 | <b>5</b> 0359  | 0.7   | <b>20</b> 0301 | 0.301 |
| 1353           | 0.9 | 0654           | 0.1 | 0721           | -0.1 | 0723           | 0.1 | 0750           | 0.0  | 0736           | 0.1 | 0911           | 0.3   | 0832           | 0.832 |
| F 1911         | 0.5 | SA 1440        | 0.9 | M 1508         | 0.9  | TU 1516        | 0.9 | W 1525         | 0.9  | TH 1504        | 0.9 | SA 1559        | 0.8   | SU 1459        | 1.459 |
|                |     | 1954           | 0.5 | 2038           | 0.4  | 2055           | 0.4 | 2115           | 0.3  | 2059           | 0.4 | 2221           | 0.2   | 2119           | 2.119 |
| <b>6</b> 0014  | 0.8 | <b>21</b> 0036 | 0.7 | <b>6</b> 0129  | 0.7  | <b>21</b> 0138 | 0.6 | <b>6</b> 0250  | 0.7  | <b>21</b> 0221 | 0.7 | <b>6</b> 0504  | 0.7   | <b>21</b> 0355 | 0.355 |
| 0704           | 0.0 | 0723           | 0.1 | 0806           | -0.1 | 0755           | 0.1 | 0838           | 0.1  | 0810           | 0.2 | 1002           | 0.4   | 0910           | 0.910 |
| SA 1438        | 1.0 | SU 1513        | 0.9 | TU 1551        | 0.9  | W 1544         | 0.9 | TH 1604        | 0.9  | F 1529         | 0.8 | SU 1625        | 0.8   | M 1518         | 1.518 |
| 1956           | 0.5 | 2029           | 0.5 | 2133           | 0.4  | 2128           | 0.4 | 2207           | 0.3  | 2127           | 0.3 | 2310           | 0.1   | 2158           | 2.158 |
| <b>7</b> 0053  | 0.8 | <b>22</b> 0109 | 0.7 | <b>7</b> 0236  | 0.7  | <b>22</b> 0228 | 0.6 | <b>7</b> 0402  | 0.6  | <b>22</b> 0314 | 0.7 | <b>7</b> 0612  | 0.7   | <b>22</b> 0457 | 0.457 |
| 0744           | 0.0 | 0753           | 0.1 | 0852           | 0.0  | 0830           | 0.1 | 0927           | 0.2  | 0847           | 0.2 | 1058           | 0.5   | 0954           | 0.954 |
| SU 1523        | 1.0 | M 1545         | 0.9 | W 1634         | 0.9  | TH 1614        | 0.8 | F 1642         | 0.8  | SA 1553        | 0.8 | M 1642         | 0.7   | TU 1536        | 1.536 |
| 2044           | 0.5 | 2106           | 0.5 | 2233           | 0.4  | 2204           | 0.4 | 2302           | 0.2  | 2201           | 0.3 |                |       | 2248           | 2.248 |
| <b>8</b> 0135  | 0.8 | <b>23</b> 0147 | 0.7 | <b>8</b> 0353  | 0.6  | <b>23</b> 0325 | 0.6 | <b>8</b> 0517  | 0.6  | <b>23</b> 0412 | 0.6 | <b>8</b> 0002  | 0.1   | <b>23</b> 0610 | 0.610 |
| 0825           | 0.0 | 0824           | 0.1 | 0943           | 0.1  | 0907           | 0.2 | 1023           | 0.3  | 0927           | 0.3 | 0723           | 0.7   | 1052           | 1.052 |
| M 1609         | 0.9 | TU 1619        | 0.9 | TH 1717        | 0.8  | F 1646         | 0.8 | SA 1719        | 0.8  | SU 1616        | 0.8 | TU 1207        | 0.5   | W 1607         | 1.607 |
| 2139           | 0.5 | 2146           | 0.5 | 2337           | 0.3  | 2243           | 0.4 | 2358           | 0.2  | 2241           | 0.2 | 1707           | 0.7   | 2343           | 2.343 |
| <b>9</b> 0223  | 0.7 | <b>24</b> 0230 | 0.6 | <b>9</b> 0516  | 0.6  | <b>24</b> 0428 | 0.6 | <b>9</b> 0635  | 0.6  | <b>24</b> 0517 | 0.6 | <b>9</b> 0057  | 0.2   | <b>24</b> 0729 | 0.729 |
| 0910           | 0.0 | 0857           | 0.1 | 1042           | 0.2  | 0949           | 0.3 | 1129           | 0.4  | 1013           | 0.4 | 0842           | 0.7   | 1215           | 1.215 |
| TU 1656        | 0.9 | W 1655         | 0.8 | F 1800         | 0.8  | SA 1717        | 0.8 | SU 1755        | 0.8  | M 1638         | 0.8 | W 1328         | 0.6   | TH 1649        | 1.649 |
| 2243           | 0.5 | 2231           | 0.5 |                |      | 2329           | 0.3 |                |      | 2330           | 0.2 | 1744           | 0.7   |                |       |
| <b>10</b> 0327 | 0.7 | <b>25</b> 0324 | 0.6 | <b>10</b> 0040 | 0.2  | <b>25</b> 0538 | 0.6 | <b>10</b> 0054 | 0.1  | <b>25</b> 0632 | 0.7 | <b>10</b> 0153 | 0.2   | <b>25</b> 0049 | 0.049 |
| 1000           | 0.1 | 0934           | 0.2 | 0842           | 0.6  | 1040           | 0.3 | 0754           | 0.6  | 1114           | 0.5 | 1010           | 0.7   | 0854           | 0.854 |
| W 1744         | 0.9 | TH 1734        | 0.8 | SA 1159        | 0.4  | SU 1749        | 0.8 | M 1245         | 0.5  | TU 1705        | 0.8 | TH 1506        | 0.6   | F 1400         | 1.400 |
| 2358           | 0.5 | 2325           | 0.4 | 1843           | 0.8  |                |     | 1830           | 0.7  |                |     | 1835           | 0.6   | 1747           | 1.747 |
| <b>11</b> 0459 | 0.5 | <b>26</b> 0434 | 0.6 | <b>11</b> 0141 | 0.2  | <b>26</b> 0021 | 0.3 | <b>11</b> 0149 | 0.1  | <b>26</b> 0026 | 0.1 | <b>11</b> 0247 | 0.2   | <b>26</b> 0159 | 0.159 |
| 1102           | 0.2 | 1018           | 0.3 | 0813           | 0.6  | 0654           | 0.6 | 0917           | 0.7  | 0753           | 0.7 | 1110           | 0.8   | 1023           | 1.023 |
| TH 1834        | 0.8 | F 1814         | 0.8 | SU 1323        | 0.4  | M 1152         | 0.4 | TU 1406        | 0.5  | W 1241         | 0.6 | F 1630         | 0.6   | SA 1542        | 1.542 |
|                |     |                |     | 1927           | 0.7  | 1821           | 0.7 | 1907           | 0.7  | 1743           | 0.8 | 1946           | 0.6   | 1932           | 1.932 |
| <b>12</b> 0113 | 0.4 | <b>27</b> 0028 | 0.4 | <b>12</b> 0235 | 0.1  | <b>27</b> 0117 | 0.2 | <b>12</b> 0241 | 0.1  | <b>27</b> 0127 | 0.1 | <b>12</b> 0337 | 0.2   | <b>27</b> 0307 | 0.307 |
| 0632           | 0.6 | 0552           | 0.6 | 0943           | 0.7  | 0816           | 0.6 | 1039           | 0.7  | 0916           | 0.7 | 1149           | 0.8   | 1118           | 1.118 |
| F 1226         | 0.3 | SA 1118        | 0.3 | M 1444         | 0.5  | TU 1321        | 0.5 | W 1530         | 0.6  | TH 1410        | 0.6 | SA 1721        | 0.5   | SU 1648        | 1.648 |
| 1925           | 0.8 | 1854           | 0.8 | 2010           | 0.7  | 1858           | 0.7 | 1950           | 0.7  | 1836           | 0.7 | 2103           | 0.6   | 2138           | 2.138 |
| <b>13</b> 0220 | 0.3 | <b>28</b> 0130 | 0.4 | <b>13</b> 0323 | 0.1  | <b>28</b> 0211 | 0.1 | <b>13</b> 0328 | 0.1  | <b>28</b> 0227 | 0.1 | <b>13</b> 0422 | 0.2   | <b>28</b> 0411 | 0.411 |
| 0811           | 0.6 | 0713           | 0.6 | 1058           | 0.7  | 0938           | 0.7 | 1137           | 0.8  | 1035           | 0.8 | 1221           | 0.9   | 1156           | 1.156 |
| SA 1353        | 0.4 | SU 1242        | 0.4 | TU 1558        | 0.5  | W 1442         | 0.5 | TH 1641        | 0.6  | F 1536         | 0.6 | SU 1757        | 0.5   | M 1736         | 1.736 |
| 2017           | 0.8 | 1934           | 0.8 | 2052           | 0.7  | 1942           | 0.7 | 2038           | 0.6  | 1943           | 0.7 | 2206           | 0.6   | 2251           | 2.251 |
| <b>14</b> 0317 | 0.3 | <b>29</b> 0221 | 0.3 | <b>14</b> 0406 | 0.1  | <b>29</b> 0304 | 0.0 | <b>14</b> 0411 | 0.1  | <b>29</b> 0326 | 0.0 | <b>14</b> 0504 | 0.2   | <b>29</b> 0507 | 0.507 |
| 0955           | 0.7 | 0838           | 0.6 | 1153           | 0.8  | 1050           | 0.8 | 1218           | 0.8  | 1136           | 0.9 | 1251           | 0.9   | 1231           | 1.231 |
| M 1513         | 0.5 | M 1408         | 0.4 | W 1700         | 0.5  | TH 1553        | 0.6 | F 1732         | 0.5  | SA 1649        | 0.6 | M 1829         | 0.5   | TU 1818        | 1.818 |
| 2106           | 0.8 | 2012           | 0.7 | 2132           | 0.7  | 2031           | 0.7 | 2129           | 0.6  | 2108           | 0.7 | 2300           | 0.7   | ● 2358         | 2.358 |
| <b>15</b> 0404 | 0.2 | <b>30</b> 0306 | 0.2 | <b>15</b> 0445 | 0.0  | <b>30</b> 0354 | 0.0 | <b>15</b> 0450 | 0.1  | <b>30</b> 0421 | 0.0 | <b>15</b> 0542 | 0.2   | <b>30</b> 0558 | 0.558 |
| 1111           | 0.8 | 1002           | 0.7 | 1237           | 0.9  | 1149           | 0.9 | 1253           | 0.9  | 1221           | 0.9 | 1319           | 0.9   | 1306           | 1.306 |
| M 1622         | 0.5 | TU 1519        | 0.5 | TH 1748        | 0.5  | F 1657         | 0.5 | SA 1814        | 0.5  | SU 1746        | 0.5 | TU 1859        | 0.4   | W 1857         | 1.857 |
| 2150           | 0.8 | 2051           | 0.7 | 2210           | 0.7  | 2127           | 0.7 | 2219           | 0.6  | 2231           | 0.7 | O 2350         | 0.7   |                |       |
|                |     | <b>31</b> 0348 | 0.1 |                |      |                |     |                |      | <b>31</b> 0514 | 0.0 | <b>31</b> 0100 | 0.100 |                |       |
|                |     | 1110           | 0.8 |                |      |                |     |                |      | 1301           | 0.9 | 0644           | 0.644 |                |       |
|                |     | W 1621         | 0.5 |                |      |                |     |                |      | M 1834         | 0.5 | TH 1341        | 1.341 |                |       |
|                |     | 2130           | 0.7 |                |      |                |     |                |      | ● 2342         | 0.7 | 1925           | 1.925 |                |       |

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

**CERTIFICATE OF COMPETENCY EXAMINATION**

GRADE : OFFICER IN CHARGE OF A NAVIGATIONAL WATCH ON SHIPS OF  
LESS THAN 500 GT (NCV)  
SUBJECT : COASTAL NAVIGATION  
DATE : 31<sup>st</sup> April 2014,

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. You may draw sketches wherever required.

- 1) Sketch or write the chart symbols for the following as per BA 5011.
  - a) Wreck with a depth of 23.5 m
  - b) Nature of sea bed being mud
  - c) Obstruction
  - d) Under water pipe line
  - e) A light house with a structural height of 15 m and fitted with a red light flashing every 15 seconds having a range of 25 miles

(05 marks each)

- 2) Find the earliest time on 11<sup>th</sup> April 2000 to cross a bar at Chittagong, Bangladesh ( $22^{\circ} 20'N$ ,  $091^{\circ} 50'E$ ) for a vessel having a draught of 4.0 m. it is advised to maintain an under keel clearance of 0.5 m. The charted depth at the bar was known to be 1.5 m.

(25 marks)

- 3) Your vessel is awaiting orders at the Panadura waiting area in position ( $06^{\circ} 40.5'N$ ,  $079^{\circ} 50'E$ ). at 0900 hrs you receive instructions to proceed to a position 5 miles North East of Little Basses Reef Light House ( $06^{\circ} 24.5'N$ ,  $081^{\circ} 44'E$ ). The ship can maintain a speed of 12 knots. Find/plot the following;

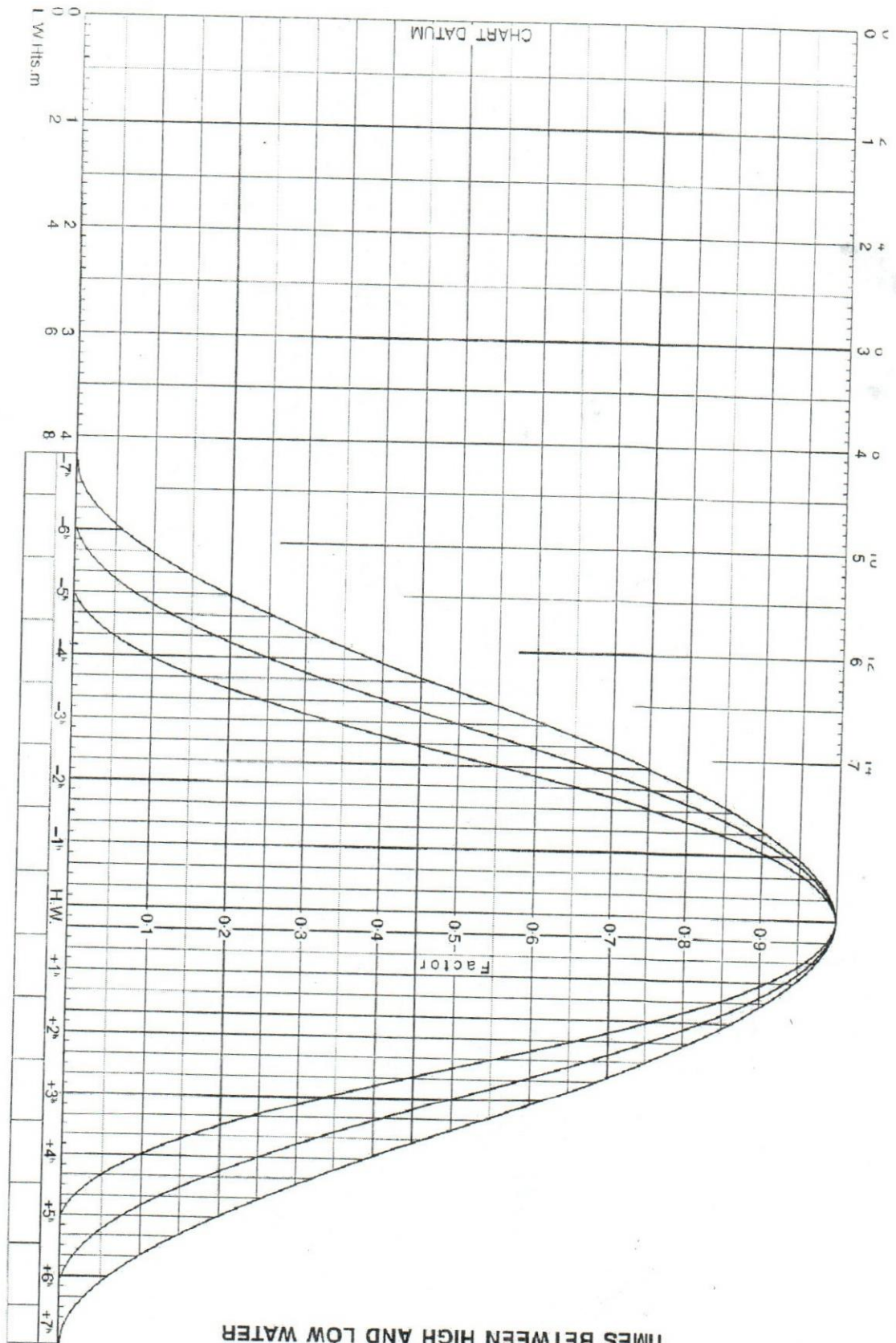
- a) Plot the position of the vessel at 0900 hrs. (05 marks)
- b) Plan a passage to reach the given position, giving reasons for choosing the proposed track. (25 marks)
- c) ETA at the destination. (10 marks)





- 4) At 1000 hrs an observer read the horizontal sextant angle between Gall Light House ( $06^{\circ} 01.5'N$ ,  $080^{\circ} 13'E$ ) and Weligama Light House ( $05^{\circ} 58'N$ ,  $080^{\circ} 25.5'E$ ) to be  $43^{\circ}$ . At the same moment Weligama Light House bore  $022^{\circ}$  (G). The IE of the sextant was nil and the Gyro was reading  $1^{\circ}$  (H). The vessel was steaming at 14 knots on a Easterly course to follow the East bound traffic lane of the traffic separation scheme off Dondra Head. A current was setting  $040^{\circ}$  (T) at 4 knots. The vessel continued on the same course till Great Basses Reef Light House was a beam to port. Find the following:
- a) Position of the vessel at 1000 hrs. (15 marks)
  - b) Compass course to steer counteracting the current (20 marks)
  - c) Speed made good along the proposed track (10 marks)
  - d) Time of the Great Basses Reef Light House coming a beam to port side. (15 marks)





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







## Answers

- 2) Ship's draught = 4.0 m  
UKC required = 0.5 m  
Total height required = 4.5 m  
Charted depth = 1.5 m  
Tide required = 3.0 m
- Earliest time = 0447 hrs on 11<sup>th</sup>
- 4) Position at 1000 hrs = 05° 44'N, 080° 19.9'E  
Compass course to steer = 103° (T) = 104° (G)  
Speed made good = 16.2 knots  
Distance to abeam the light = 57.3  
Time duration = 57.3 / 16.2 = 03h 32m  
ETA abeam = 1332 hrs





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



**CERTIFICATE OF COMPETENCY EXAMINATION**

GRADE : OFFICER IN CHARGE OF A NAVIGATIONAL WATCH ON SHIPS OF  
LESS THAN 500 GT (NCV)  
SUBJECT : COASTAL NAVIGATION  
DATE : 31<sup>st</sup> January 2014.

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Time allowed THREE hours  
Answer all questions  
Formulae and all intermediate steps taken in reaching your answer should be clearly shown. You may draw sketches wherever required.

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Total marks : 150  
Pass marks : 70%

1) Sketch or write the chart symbols for the following as per BA 5011.

- a) Submerge wreck dangerous for surface navigation
- b) Pilot boarding ground
- c) Foul area
- d) Fish haven
- e) Anchoring area

(05 marks each)

2) A vessel having a draught of 3.5 m is expecting to berth at Trincomalee harbour on 19<sup>th</sup> of March 2000. The master wants to keep an under keel clearance of 0.5 m. The charted depth at the berth is 3.6 m. Calculate the earliest time in the evening at which the vessel can enter the berth safely.

(20 marks)

3) At 1000 hrs an observer read a horizontal sextant angle between Little Basses Reef light house ( $06^{\circ} 29.5' N$ ,  $081^{\circ} 43.7' E$ ) and Great Basses Reef light house ( $06^{\circ} 11' N$ ,  $081^{\circ} 28.7' E$ ) to be  $043^{\circ}$ . At the same time Little Basses Reef light house bore  $112^{\circ}$  (G). The IE of the sextant was nil and the Gyro was reading  $1^{\circ}$  (H). The vessel was steaming at 10 knots on a course of  $230^{\circ}$  (T). A current was setting  $040^{\circ}$  (T) at 3 knots. The vessel continued on the same course till Great Basses Reef light house was abeam to starboard side. Find the following;

- a) Position of the vessel at 1000 hrs. (15 marks)
- b) Compass course to steer counteracting the current (20 marks)
- c) Speed made good along the proposed track (10 marks)
- d) Time of Great Basses Reef light house coming a beam to starboard side (15 marks)

4) On 14<sup>th</sup> January 2014, your vessel is drifting south of Hambanthota port awaiting orders and at 0800 hrs Hambantota Point ( $06^{\circ} 07.3' N$ ,  $081^{\circ} 07.6' E$ ) bore  $000^{\circ}(T)$  with a radar range of 4 nautical miles. She is capable of making a speed of 12 knots and has a maximum draught of 4 m. You receive orders to proceed to port of Colombo. Answer the following questions;

- a) Plot the position at 0800 hrs. (05 marks)
- b) Plan a passage from the position at 0800 hrs to pilot boarding ground at Colombo giving reasons for choosing the proposed track. (30 marks)
- c) Calculate the ETA at the Colombo pilot boarding grounds assuming the departure time is 1000 hrs (10 marks)





### SRI LANKA - TRINCOMALEE

LAT 8°33'N LONG 81°13'E

TIME ZONE -0530

TIMES AND HEIGHTS OF HIGH AND LOW WATERS

| JANUARY |     |         |     | FEBRUARY |     |         |     | MARCH   |     |         |     | APRIL   |     |         |     |
|---------|-----|---------|-----|----------|-----|---------|-----|---------|-----|---------|-----|---------|-----|---------|-----|
| Time    | m   | Time    | m   | Time     | m   | Time    | m   | Time    | m   | Time    | m   | Time    | m   | Time    | m   |
| 1 0406  | 0.6 | 16 0233 | 0.6 | 1 0044   | 0.3 | 16 0531 | 0.4 | 1 0032  | 0.3 | 16 0540 | 0.4 | 1 0040  | 0.2 | 16 0055 | 0.1 |
| 1105    | 0.3 | 0932    | 0.2 | 0534     | 0.5 | 1130    | 0.1 | 0522    | 0.4 | 1124    | 0.1 | 0644    | 0.5 | 0707    | 0.6 |
| SA 1726 | 0.7 | SU 1645 | 0.6 | TU 1153  | 0.2 | W 1826  | 0.6 | W 1121  | 0.2 | TH 1808 | 0.6 | SA 1204 | 0.2 | SU 1306 | 0.2 |
| 2356    | 0.4 | 2222    | 0.3 | 1828     | 0.6 |         |     | 1801    | 0.5 |         |     | 1851    | 0.6 | 1904    | 0.6 |
| 2 0501  | 0.6 | 17 0407 | 0.6 | 2 0126   | 0.3 | 17 0038 | 0.2 | 2 0109  | 0.2 | 17 0029 | 0.1 | 2 0056  | 0.2 | 17 0133 | 0.1 |
| 1146    | 0.3 | 1037    | 0.2 | 0627     | 0.5 | 0635    | 0.5 | 0619    | 0.4 | 0637    | 0.5 | 0721    | 0.5 | 0741    | 0.6 |
| SU 1808 | 0.7 | M 1745  | 0.7 | W 1225   | 0.2 | TH 1231 | 0.1 | TH 1203 | 0.2 | F 1226  | 0.1 | SU 1242 | 0.2 | M 1349  | 0.2 |
|         |     | 2337    | 0.3 | 1908     | 0.6 | 1912    | 0.6 | 1846    | 0.6 | 1854    | 0.6 | 1924    | 0.6 | 1939    | 0.6 |
| 3 0047  | 0.4 | 18 0527 | 0.6 | 3 0154   | 0.3 | 18 0131 | 0.1 | 3 0130  | 0.2 | 18 0117 | 0.1 | 3 0118  | 0.1 | 18 0207 | 0.1 |
| 0549    | 0.6 | 1139    | 0.1 | 0712     | 0.5 | 0727    | 0.5 | 0704    | 0.5 | 0722    | 0.5 | 0754    | 0.6 | 0814    | 0.6 |
| M 1218  | 0.3 | TU 1837 | 0.7 | TH 1251  | 0.2 | F 1324  | 0.1 | F 1235  | 0.2 | SA 1317 | 0.1 | M 1318  | 0.2 | TU 1428 | 0.2 |
| 1846    | 0.7 |         |     | 1945     | 0.7 | 1954    | 0.7 | 1923    | 0.6 | 1933    | 0.6 | 1954    | 0.6 | O 2012  | 0.6 |
| 4 0128  | 0.4 | 19 0041 | 0.2 | 4 0213   | 0.2 | 19 0218 | 0.1 | 4 0144  | 0.2 | 19 0159 | 0.1 | 4 0145  | 0.1 | 19 0238 | 0.1 |
| 0634    | 0.6 | 0630    | 0.6 | 0753     | 0.5 | 0811    | 0.5 | 0742    | 0.5 | 0800    | 0.6 | 0824    | 0.6 | 0847    | 0.7 |
| 1242    | 0.3 | W 1236  | 0.1 | F 1319   | 0.2 | SA 1411 | 0.1 | SA 1305 | 0.2 | SU 1402 | 0.1 | TU 1357 | 0.2 | W 1504  | 0.2 |
| 1923    | 0.7 | 1923    | 0.7 | 2020     | 0.7 | O 2033  | 0.7 | 1957    | 0.6 | 2009    | 0.7 | 2021    | 0.6 | 2047    | 0.6 |
| 5 0159  | 0.3 | 20 0137 | 0.2 | 5 0230   | 0.2 | 20 0300 | 0.1 | 5 0159  | 0.2 | 20 0237 | 0.0 | 5 0218  | 0.1 | 20 0305 | 0.1 |
| 0717    | 0.6 | 0725    | 0.6 | 0830     | 0.5 | 0853    | 0.6 | 0816    | 0.5 | 0835    | 0.6 | 0853    | 0.6 | 0922    | 0.7 |
| M 1304  | 0.2 | TH 1328 | 0.1 | SA 1350  | 0.2 | SU 1456 | 0.1 | SU 1337 | 0.1 | M 1443  | 0.1 | W 1437  | 0.1 | TH 1538 | 0.2 |
| 2000    | 0.8 | 2007    | 0.8 | 2052     | 0.7 | 2110    | 0.7 | 2027    | 0.6 | O 2043  | 0.7 | 2047    | 0.6 | 2123    | 0.6 |
| 6 0225  | 0.3 | 21 0229 | 0.2 | 6 0252   | 0.2 | 21 0341 | 0.1 | 6 0221  | 0.1 | 21 0312 | 0.0 | 6 0254  | 0.0 | 21 0330 | 0.1 |
| 0758    | 0.6 | 0815    | 0.6 | 0904     | 0.6 | 0933    | 0.6 | 0846    | 0.6 | 0910    | 0.6 | 0923    | 0.6 | 0959    | 0.7 |
| 1330    | 0.2 | F 1418  | 0.1 | SU 1425  | 0.2 | M 1538  | 0.1 | M 1412  | 0.1 | TU 1521 | 0.1 | TH 1520 | 0.1 | F 1613  | 0.2 |
| 2036    | 0.8 | O 2050  | 0.8 | 2122     | 0.7 | 2146    | 0.7 | 2053    | 0.7 | 2117    | 0.7 | 2117    | 0.6 | 2201    | 0.6 |
| 7 0249  | 0.3 | 22 0317 | 0.1 | 7 0319   | 0.2 | 22 0420 | 0.1 | 7 0249  | 0.1 | 22 0344 | 0.1 | 7 0333  | 0.0 | 22 0355 | 0.1 |
| 0638    | 0.6 | 0903    | 0.6 | 0935     | 0.6 | 1013    | 0.6 | 0915    | 0.6 | 0946    | 0.6 | 0957    | 0.6 | 1040    | 0.7 |
| 1461    | 0.2 | SA 1505 | 0.1 | M 1502   | 0.2 | TU 1618 | 0.1 | TU 1450 | 0.1 | W 1557  | 0.1 | F 1606  | 0.1 | SA 1649 | 0.2 |
| 2111    | 0.8 | 2131    | 0.8 | 2148     | 0.7 | 2223    | 0.7 | 2117    | 0.7 | 2152    | 0.6 | 2151    | 0.6 | 2244    | 0.5 |
| 8 0315  | 0.3 | 23 0405 | 0.1 | 8 0351   | 0.2 | 23 0457 | 0.1 | 8 0322  | 0.1 | 23 0413 | 0.1 | 8 0415  | 0.0 | 23 0423 | 0.1 |
| 0916    | 0.6 | 0950    | 0.6 | 1005     | 0.6 | 1054    | 0.6 | 0942    | 0.6 | 1025    | 0.6 | 1037    | 0.6 | 1125    | 0.6 |
| SA 1436 | 0.2 | SU 1552 | 0.1 | TU 1542  | 0.2 | W 1658  | 0.2 | W 1530  | 0.1 | TH 1633 | 0.1 | SA 1657 | 0.1 | SU 1730 | 0.2 |
| 2145    | 0.8 | 2212    | 0.8 | 2212     | 0.7 | 2301    | 0.6 | 2141    | 0.6 | 2229    | 0.6 | 2231    | 0.5 | 2331    | 0.5 |
| 9 0345  | 0.3 | 24 0451 | 0.1 | 9 0427   | 0.1 | 24 0534 | 0.1 | 9 0358  | 0.1 | 24 0441 | 0.1 | 9 0501  | 0.1 | 24 0457 | 0.2 |
| 0954    | 0.6 | 1037    | 0.6 | 1036     | 0.6 | 1139    | 0.6 | 1013    | 0.6 | 1106    | 0.6 | 1123    | 0.6 | 1215    | 0.6 |
| SU 1515 | 0.2 | M 1639  | 0.2 | W 1624   | 0.2 | TH 1739 | 0.2 | TH 1613 | 0.1 | F 1709  | 0.2 | SU 1755 | 0.2 | M 1820  | 0.2 |
| 2217    | 0.8 | 2254    | 0.7 | 2236     | 0.7 | 2341    | 0.6 | 2209    | 0.6 | 2309    | 0.5 | 2319    | 0.5 |         |     |
| 10 0420 | 0.3 | 25 0538 | 0.2 | 10 0507  | 0.1 | 25 0609 | 0.2 | 10 0438 | 0.1 | 25 0508 | 0.1 | 10 0553 | 0.1 | 25 0030 | 0.4 |
| 1030    | 0.6 | 1127    | 0.6 | 1112     | 0.6 | 1230    | 0.5 | 1049    | 0.6 | 1152    | 0.6 | 1221    | 0.6 | 0537    | 0.2 |
| W 1555  | 0.2 | TU 1726 | 0.2 | TH 1711  | 0.2 | F 1824  | 0.3 | F 1700  | 0.1 | SA 1750 | 0.2 | M 1907  | 0.2 | TU 1314 | 0.6 |
| 2246    | 0.8 | 2336    | 0.7 | 2307     | 0.6 |         |     | 2243    | 0.6 | 2354    | 0.5 |         |     | 1924    | 0.3 |
| 11 0459 | 0.3 | 26 0627 | 0.2 | 11 0552  | 0.1 | 26 0027 | 0.5 | 11 0522 | 0.1 | 26 0537 | 0.2 | 11 0024 | 0.4 | 26 0147 | 0.4 |
| 1108    | 0.6 | 1220    | 0.6 | 1157     | 0.6 | 0645    | 0.2 | 1133    | 0.6 | 1246    | 0.5 | 0658    | 0.2 | 0626    | 0.2 |
| TU 1640 | 0.3 | W 1817  | 0.3 | F 1804   | 0.2 | SA 1330 | 0.5 | SA 1754 | 0.2 | SU 1843 | 0.2 | TU 1340 | 0.5 | W 1420  | 0.6 |
| 2314    | 0.7 |         |     | 2345     | 0.6 | 1930    | 0.3 | 2324    | 0.5 | 2033    | 0.2 | 2033    | 0.2 | 2046    | 0.3 |
| 12 0542 | 0.3 | 27 0022 | 0.7 | 12 0643  | 0.1 | 27 0124 | 0.5 | 12 0612 | 0.1 | 27 0051 | 0.4 | 12 0219 | 0.4 | 27 0313 | 0.4 |
| 1151    | 0.6 | 0717    | 0.2 | 1300     | 0.5 | 0729    | 0.2 | 1230    | 0.5 | 0614    | 0.2 | 0824    | 0.2 | 0731    | 0.3 |
| W 1728  | 0.3 | TH 1320 | 0.6 | SA 1910  | 0.3 | SU 1443 | 0.5 | SU 1901 | 0.2 | M 1354  | 0.5 | W 1517  | 0.5 | TH 1529 | 0.6 |
| 2344    | 0.7 | 1918    | 0.3 |          |     | 2130    | 0.3 |         |     | 2014    | 0.3 | 2201    | 0.2 | 2203    | 0.3 |
| 13 0630 | 0.3 | 28 0113 | 0.6 | 13 0035  | 0.5 | 28 0242 | 0.4 | 13 0016 | 0.5 | 28 0212 | 0.4 | 13 0421 | 0.4 | 28 0428 | 0.4 |
| 1248    | 0.6 | 0813    | 0.2 | 0744     | 0.2 | 0840    | 0.2 | 0714    | 0.1 | 0704    | 0.2 | 0956    | 0.2 | 0854    | 0.3 |
| TH 1825 | 0.3 | F 1428  | 0.5 | SU 1433  | 0.5 | M 1600  | 0.5 | M 1355  | 0.5 | TU 1510 | 0.2 | TH 1638 | 0.5 | F 1631  | 0.6 |
|         |     | 2042    | 0.4 | 2035     | 0.3 | 2325    | 0.3 | 2030    | 0.2 | 2229    | 0.3 | 2314    | 0.2 | 2251    | 0.3 |
| 14 0020 | 0.7 | 29 0212 | 0.5 | 14 0149  | 0.5 | 29 0409 | 0.4 | 14 0141 | 0.4 | 29 0345 | 0.4 | 14 0537 | 0.4 | 29 0527 | 0.5 |
| 1724    | 0.3 | 0915    | 0.3 | 0859     | 0.2 | 1014    | 0.2 | 0836    | 0.2 | 0624    | 0.3 | 1114    | 0.2 | 1016    | 0.3 |
| F 1407  | 0.6 | SA 1540 | 0.5 | M 1614   | 0.5 | TU 1708 | 0.5 | TU 1545 | 0.5 | W 1623  | 0.5 | F 1739  | 0.6 | SA 1722 | 0.6 |
| 1934    | 0.4 | 2220    | 0.4 | 2212     | 0.3 |         |     | 2209    | 0.2 | 2346    | 0.2 |         |     | 2326    | 0.2 |
| 15 0717 | 0.6 | 30 0322 | 0.5 | 15 0354  | 0.4 |         |     | 15 0411 | 0.4 | 30 0502 | 0.4 | 15 0009 | 0.1 | 30 0613 | 0.5 |
| 0825    | 0.2 | 1017    | 0.3 | 1018     | 0.1 |         |     | 1007    | 0.2 | 1013    | 0.3 | 0628    | 0.5 | 1118    | 0.3 |
| 1333    | 0.6 | SU 1646 | 0.6 | TU 1728  | 0.6 |         |     | W 1708  | 0.5 | TH 1723 | 0.5 | SA 1215 | 0.2 | SU 1805 | 0.6 |
| 2056    | 0.4 | 2344    | 0.4 | 2334     | 0.2 |         |     | 2329    | 0.2 |         |     | 1825    | 0.6 | 2358    | 0.2 |
|         |     |         |     |          |     |         |     |         |     |         |     |         |     |         |     |
|         |     | 31 0433 | 0.5 |          |     |         |     | 31 0021 | 0.2 |         |     |         |     |         |     |
|         |     | 1111    | 0.2 |          |     |         |     | 0600    | 0.4 |         |     |         |     |         |     |
|         |     | M 1742  | 0.6 |          |     |         |     | F 1121  | 0.3 |         |     |         |     |         |     |
|         |     |         |     |          |     |         |     | 1811    | 0.6 |         |     |         |     |         |     |





### Answers

#### Answer - 2

Draught = 3.5 m

UKC = 0.5 m

Depth required = 4.0 m

Charted depth = 3.6 m

Tide required = 0.4 m

Duration = 06<sup>h</sup> 07<sup>m</sup>

Earliest time = 1705 hrs



#### Answer - 3

a) 06<sup>o</sup> 20.6' N, 081<sup>o</sup> 53.6' E

b) Compass course to steer counteracting the current = 227<sup>o</sup> (T)

c) Speed made good = 7 knots

d) Distance until the Great Basses is abeam = 24.6'

Steaming time = 24.6 / 7 = 3<sup>h</sup> 31<sup>m</sup>

Time abeam = 10<sup>h</sup> 00<sup>m</sup> + 3<sup>h</sup> 31<sup>m</sup> = 1331 hrs

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



**CERTIFICATE OF COMPETENCY EXAMINATION**

GRADE : OFFICER IN CHARGE OF A NAVIGATIONAL WATCH ON SHIPS OF  
LESS THAN 500 GT (NCV)  
SUBJECT : GENERAL SHIP KNOWLEDGE  
DATE : 31<sup>st</sup> January 2014,

---

Time allowed THREE hours  
Answer all questions  
Formulae and all intermediate steps taken in reaching your answer should be clearly shown. You may draw sketches wherever required.

Total marks : 200  
Pass marks : 50%

---

**SECTION I**

- 1) Write short notes on the following:
  - a) Squat
  - b) ISPS Code
  - c) Centre of gravity
  - d) Load density
  - e) Angle of repose

(05 marks each)
- 2) A vessel of 700 t displacement floats in salt water. She expects to proceed to a port where the water density is  $1.015 \text{ tm}^{-3}$ . Calculate the amount of cargo to be discharged if she wants to remain at the same salt water draught.

(25 marks)
- 3) A weight of 15 t to be loaded on a vessel with a initial displacement of 650 t and a initial KG of 4.2 m. The weight is to be loaded using ship's derrick. The head of the derrick is 10 m above the keel. The weight is to be loaded 1.0 m above the keel at the centre line of the vessel. Calculate the GM of the vessel in the following cases assuming the KM is 5 m and remains constant throughout;
  - a) Once the weight is taken by the derrick. (15 marks)
  - b) After the completion of loading (10 marks)
- 4) In diagrams of longitudinal and transverse cross sections of a vessel show the following:
  - i) Length overall



- ii) Length between perpendiculars
- iii) Base line
- iv) Centre of Buoyancy
- v) Metacentre
- vi) Keel rake
- vii) Stem rake
- viii) Camber
- ix) Flare
- x) Rise of floor.

(2.5 marks each)



**SECTION II**

Answer all questions.

Each question carries 04 marks.

1) What are the contents of Admiralty List of Radio Signals?

.....  
.....

2) What is the meaning of Temporary & Preliminary notices in chart corrections?

.....  
.....  
.....

3) Explain the meaning of variation and how it occurs.

.....  
.....  
.....

4) The index error of a sextant has to be verified only when,

- a) the sextant is serviced
- b) every time an observation is made
- c) the corrections are made using the adjustment screws
- d) the collimation error is corrected

5) With regards to radar, what is a blind sector?

.....  
.....

6) A Precision Aneroid Barometer requires to be corrected for,

- a) Index error, height and latitude
- b) Index error and height
- c) None
- d) Height and latitude

7) When a vessel with a right hand propeller operates the engines stern, the bow turns to ..... side.

8) A tender vessel means a vessel with a ..... GM.

- 9) List the characteristic path of a tropical cyclone in the northern hemisphere is to move,
- a) SE'ly and re-curve SW'ly later
  - b) NW'ly and re-curve N'ly later
  - c) SW'ly and re-curve SE'ly later
  - d) W'ly and re-curve NE'ly later

10) With regards to a TRSwind veering means,

.....  
.....

11) Give four guidelines you will comply with in discharging pump room bilges.

- a) .....
- b) .....
- c) .....
- d) .....

12) According to the Ballast Water Convention ship's ballast water may be discharged in ..... nautical miles away from land and in depths of more than ..... metres or ..... nautical miles away from land and in depths of more than ..... metres.

13) Name four types of lashing material used in securing containers.

- a) .....
- b) .....
- c) .....
- d) .....

14) Give four precautions to be taken when taking a heavy weight by using ship's derrick.

- a) .....
- b) .....
- c) .....
- d) .....

15) List the precautions to be taken in case of loading packages containing IMDG.

- a) .....
- b) .....
- c) .....
- d) .....

16) List the precautions to be taken while loading crude oil.

- a) .....



- b) .....
- c) .....
- d) .....

17) The markings on a life raft are;

.....  
.....  
.....

18) In case of a man over board while on the passage, I will,

.....  
.....  
.....

19) The best extinguisher to choose for a small electrical fire will be,

- a) Dry powder
- b) Foam
- c) Water
- d) Carbon dioxide

20) The length of an anchor shackle is ..... metres.

21) The western limit of Near Coastal Voyages extend upto,

- a) Mumbai
- b) Aden
- c) Socotra island
- d) Karachi

22) A ship's rigging plan provides,

- a) .....
- b) .....
- c) .....
- d) .....

23) The Certificate of Registry is issued to a vessel by the .....

24) The STCW 78 as amended 2010 Convention was fully implemented from .....

25) What are the countries signatory to BIMMS Agreement



- a) .....
- b) .....
- c) .....
- d) .....
- e) .....

## Answers



### Question - 2

$$\text{Density} = \text{Mass} / \text{Volume}$$

In salt water,

$$\text{Density}_{\text{sw}} = \text{Mass}_{\text{sw}} / \text{under water volume}_{\text{sw}}$$

$$\text{Under water volume}_{\text{sw}} = \text{Mass}_{\text{sw}} / \text{Density}_{\text{sw}}$$

05 marks

In dock water,

$$\text{Density}_{\text{dw}} = \text{Mass}_{\text{dw}} / \text{under water volume}_{\text{dw}}$$

$$\text{Under water volume}_{\text{dw}} = \text{Mass}_{\text{dw}} / \text{Density}_{\text{dw}}$$

05 marks

Since the vessel is to remain at the same draught both in salt water and dock water,

$$\text{Under water volume}_{\text{sw}} = \text{Under water volume}_{\text{dw}}$$

10 marks

Therefore,

$$\text{Mass}_{\text{sw}} / \text{Density}_{\text{sw}} = \text{Mass}_{\text{dw}} / \text{Density}_{\text{dw}}$$

$$700 / 1.025 = \text{Mass}_{\text{dw}} / 1.015$$

$$\text{Mass}_{\text{dw}} = 700 \times 1.015 / 1.025 = 693.2 \text{ t}$$

$$\text{Therefore, cargo to discharge} = 700 - 693.2 = \underline{6.8 \text{ t}}$$

05 marks

### Answer - 3

$$\text{Initial GM} = \text{KM} - \text{initial KG}$$

$$= 5 - 4.2 = 0.8 \text{ m}$$

05 marks

$$\text{GG}_1 = w \times d / W$$

a) When the weight is taken by the derrick,

$$\text{GG}_1 = 15 \times (10 - 4.2) / 665$$

$$= 0.13 \text{ m}$$

$$\text{Therefore, GM} = 0.8 - 0.13 = \underline{0.67 \text{ m}}$$

10 marks

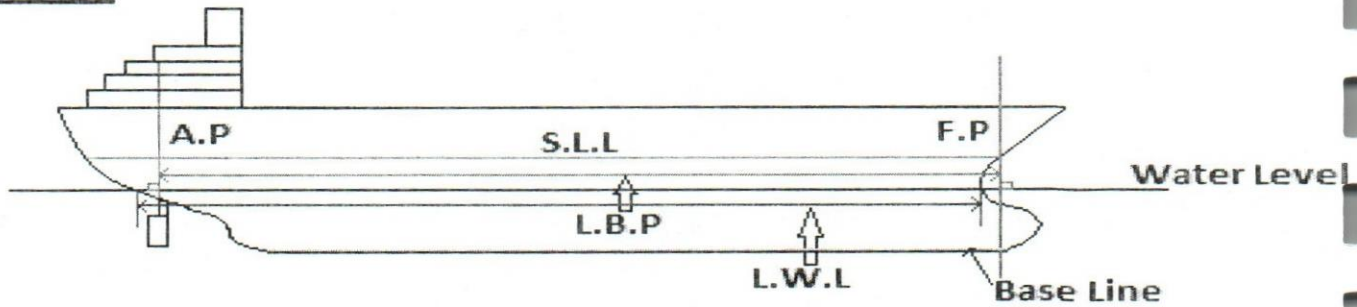


b) When the weight is loaded,  
 $GG_1 = 15 \times (4.2 - 1) / 665$   
 $= 0.07 \text{ m}$

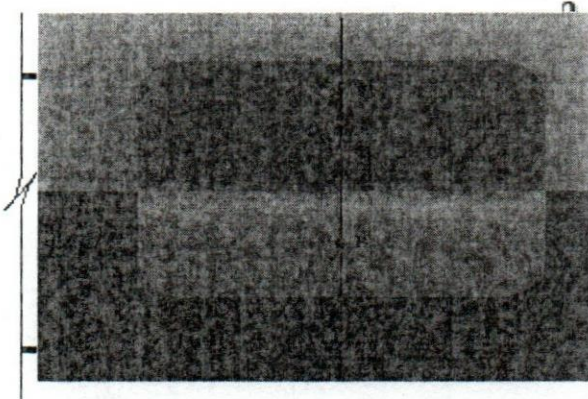
Therefore,  $GM = 0.8 - 0.07 = 0.73 \text{ m}$

10 marks

**Answer - 4**

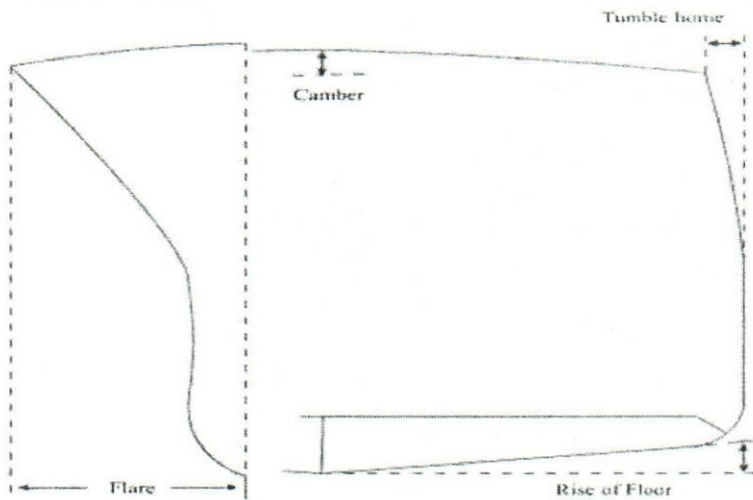


**Even Keel**



Keel and Stem rake

M= Metacentre B= COB



(2.5 marks each Total = 25 marks).

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

**CERTIFICATE OF COMPETENCY EXAMINATION**

GRADE : OFFICER IN CHARGE OF A NAVIGATIONAL WATCH ON SHIPS OF  
LESS THAN 500 GT (NCV)

SUBJECT : GENERAL SHIP KNOWLEDGE

DATE : 31<sup>st</sup> April 2013,

Time allowed THREE hours

Total marks : 150

Answer all questions

Pass marks : 50%

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

**SECTION I**

1) Write short notes on the following;

- a) Free surface effect
- b) BIMMS Agreement
- c) Angle of loll
- d) Deadweight
- e) Squat effect

(05 marks each)

2) A vessel arrives in port with a displacement of 7000 t and KG 7.0 m. She then discharges and loads as follows;

Discharges 800 t – KG 5.0 m,

300 t – KG 8.5 m,

250 t – KG 4.2 m,

400 t – KG 7.5 m

Loads 350 t – KG 8.0 m

450 t – KG 5.0 m

500 t – KG 3.0 m

Also replenishes bunkers 600 t (KG 1.0 m) and fresh water 100 t (KG 7.5 m). At departure from the port the vessel had a final KM of 9.0 m. Find the departure GM of the vessel.

(25 marks)

3) a) Sketch and name the components of a stockless anchor.



(15 marks)

b) List the factors to be considered when deciding the amount of cable to be use prior to dropping the anchor.

(10 marks)

4) A vessel of 6,000 t displacement has a KM of 7.2 m and a KG of 6.7 m while floating in upright condition. A weight of 60 t already on board is shifted transversely from port side to starboard side. Find the following;

a) Shift of COG

(10 marks)

b) Resulting list to the starboard side

(15 marks)

---

**SECTION II**

Answer all questions. Each question carries 04 marks.

---

1) Rat guards are placed on board a moored vessel to;

.....  
.....

2) Explain the meaning of a temporary correction in relation to chart corrections & how to do such a correction.

.....  
.....  
.....

3) What are the signals to be displayed during bunkering and loading/discharging dangerous goods?

.....  
.....

4) Yawing means;

.....  
.....

5) An inclinometer is used to measure;



.....  
.....

6) An anticyclone is the name given to a system of .....  
The wind circulation will be ..... in the Northern Hemisphere.

7) Generally, a TRS moves in a ..... direction after re-curving in the Northern Hemisphere.

8) The ideal months for the SW monsoon are;  
.....  
.....

9) The scope of the anchor is decided on the following factors  
i) .....  
ii) .....  
iii) .....  
iv) .....

10) What information do you find in Admiralty Sailing Directions?  
i) .....  
ii) .....  
iii) .....  
iv) .....

11) Spring tides occur during ..... and ..... days.

12) What information do you find in Admiralty weekly notices to mariners?  
i) .....  
ii) .....  
iii) .....  
iv) .....

13) What is the name of the international publication that you have to refer when treating sick people on board?  
.....

14) Panting beams & panting stringers are used to reduce .....



15) The advantages of ship's double bottom are;

- i) .....
- ii) .....
- iii) .....

16) What precautions would you take before accepting hazardous cargo on board?

- i) .....
- ii) .....
- iii) .....
- iv) .....

17) What precautions would you take before loading a heavy lift?

- i) .....
- ii) .....
- iii) .....
- iv) .....

18) The error of perpendicularity on a sextant occurs when,

.....  
.....

19) A Radar works on the principle of;

.....  
.....  
.....

20) Deviation is the angle between ..... and .....  
of a magnetic compass.

21) What are the advantages of leading lights during coastal navigation?

.....  
.....

22) What are the advantages of transit bearing during coastal navigation?

.....  
.....

23) The weight of the life buoys fitted to man over board marker is ..... than the  
weight of the other life buoys on board.

24) During a man over board situation;

- i) .....
- ii) .....
- iii) .....
- iv) .....

25) Briefly explain the purpose of port state control (PSC).

.....  
.....  
.....  
.....





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



**CERTIFICATE OF COMPETENCY EXAMINATION**

GRADE : OFFICER IN CHARGE OF A NAVIGATIONAL WATCH ON SHIPS OF  
LESS THAN 500 GT (NCV)  
SUBJECT : COASTAL NAVIGATION  
DATE : 11<sup>st</sup> August 2013,

---

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. You may draw sketches wherever required.

---

- 1) The draught of the vessel is 3.0 m and the required under keel clearance is 0.5 m. She is expected to berth at port of Trincomalee ( $8^{\circ} 33' N$ ,  $081^{\circ} 13' E$ ) at a berth having a charted depth of 3.2 m. Her ETA at the berth is 0600 hrs on 8<sup>th</sup> April 2000. Calculate the earliest possible time that the vessel can be berthed fulfilling the above requirements.  
(25 marks)
  
- 2) Sketch/write and show the chart symbols for the following as per chart BA 5011.
  - a) Wreck safe for surface navigation
  - b) Fish haven
  - c) Established direction of traffic flow
  - d) Submarine cable
  - e) Limit of area into which entry is prohibited(05 marks each)
  
- 3) At 1000 hrs an observer read the horizontal sextant angle between Galle Light House ( $06^{\circ} 01.5' N$ ,  $080^{\circ} 13.5' E$ ) and Weligama Light House ( $05^{\circ} 58' N$ ,  $080^{\circ} 25.5' E$ ) to be  $43^{\circ}$ . At the same moment, Weligama Light House bore  $022^{\circ}$  (G). IE of the sextant was nil and the gyro error  $1^{\circ}$  (H). The vessel was steaming at 14 knots on a course to follow the East bound traffic lane of the traffic separation scheme off Dondra Head. A current was setting  $040^{\circ}$  (T) at 4 knots. The vessel continued on the same course till Great Basses Reef Light House was abeam to port. Find the following;
  - a) Position of the vessel at 1000 hrs. (15 marks)
  - b) Compass course to steer counteracting the current. (20 marks)
  - c) Speed made good along the proposed track. (10 marks)
  - d) Time of Great Basses Reef Light House coming abeam to port side. (15 marks)

4) Your vessel is anchored Sangama Kanda Light ( $07^{\circ} 01.5' N$ ,  $081^{\circ} 52.5' E$ ) bearing  $2.0' x 340^{\circ}$  (T) awaiting orders. At 1000 hrs you are advised to proceed to Galle ( $06^{\circ} 01.5' N$ ,  $080^{\circ} 13.5' E$ ) for loading. Your vessel can make 10 knots and draws 4.5 m draught. She is equipped with Radar, Magnetic compass, Gyro compass, Auto Pilot, Echo Sounder and GPS. Draw up your passage plan until  $2'$  due South of Galle Light House. Find the following;

- a) Position of the vessel at 1000 hrs. (05 marks)
- b) Explain your passage to reach the given position, giving reasons for choosing the proposed track. (25 marks)
- c) ETA at  $2'$  due South of Galle Light House. (10 marks)

## DIRECTORATE OF MERCHANT SHIPPING

(C.O.W.)

## GOVERNMENT OF SRI LANKA.

## CERTIFICATE OF COMPETENCY EXAMINATION.

GRADE : OFFICER IN CHARGE OF A NAVIGATIONL WATCH  
ON SHIPS OF LESS THAN 500 GT (NCV)

SUBJECT : GENERAL SHIP KNOWLEDGE

DATE : 26<sup>th</sup> March 2009 , 0900 hrs to 1200 hrs

Time allowed THREE hours.

Total marks 200

Answer ALL questions.

Pass mark 70%

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

## SECTION I

(1) Write short notes on the following :

(a) Head Reach.

(b) Angle of Repose.

(c) Dead Weight.

(d) Squat.

(e) Load Density

(04 Marks each)

(2) A boxed shaped vessel 20m x 6m x 2.5m floats at a draft of 1.5m in water of density 1013 kg /m<sup>3</sup>. Find the displacement of the vessel in tonnes and the height of the centre of buoyancy above the keel.

(15 Marks)

(3) i) Sketch and name the components of a stockless anchor.

(15 Marks)

ii) List the factors to be considered when deciding the amount of cable to be used prior to dropping the anchor.

(10 Marks)

iii) With the use of a diagram, illustrate how the third joining shackle of the anchor cable is marked.

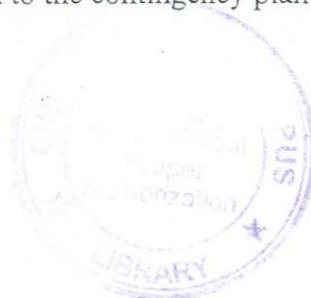
(05 Marks)

(4) A vessel having a displacement of 300 tonnes has a KG of 2.0m. She has to load a cargo of timber at a height of 4.0m above the keel. Find how much of cargo she can load to finish with a KG of 2.2m.

(20 Marks)

(5) List the items that could be included in to the contingency plan in the event of a vessel grounding.

(15 Marks)





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

**CERTIFICATE OF COMPETENCY EXAMINATION**

**GRADE : OFFICER IN CHARGE OF A NAVIGATIONAL WATCH  
ON SHIPS OF LESS THAN 500 GT ( NCV )**

**SUBJECT : COASTAL NAVIGATION**

**DATE : 25<sup>th</sup> March 2009 , 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. II 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) A dry dock.

(ii) A light house with a structural height of 15 meters and fitted with a red light flashing every 15 seconds having range of 25 miles and equipped with a Racon responding to 3m & 10m Radars.

(iii) Nature of sea bed being clay and mud.

(iv) Clifly coast

(v) A traffic separation scheme marked by separation lines with an adjacent entry prohibited area.

( 05 Marks each )

(2) Find the latest time on 03rd December 1999 to cross a bar at Bhavnagar, India ( Lat.  $21^{\circ} 45' N$ , Long.  $072^{\circ} 14' E$  ) for vessel having a draft of 3.8m.

It is advised to maintain an under keel clearance of 1.5m. The charted depth at the bar was known to be 0.5 m.

( 25 Marks )

(3) Your vessel is awaiting orders at the Panadura (  $06^{\circ} 40.5' N$ ,  $079^{\circ} 50' E$  ) waiting area. At 0900 hrs. you receive advice from the owners to proceed to a position 5 miles North East of Little Basses Reef Light House (  $06^{\circ} 24.5' N$ ,  $081^{\circ} 44' E$  ). Ship can maintain speed of 12 Knots.

Find the following.

(a) Position of the vessel at 0900 hrs.

( 05 Marks )

(b) Plan a passage to reach the given position, giving reasons for choosing the proposed track.

( 25 Marks )

(c) ETA at the destination.

( 10 Marks )

Contd.../2



(4) At 1000 hrs. an observer read the horizontal sextant angle between Galle Light House ( $06^{\circ} 01.5' N$ ,  $080^{\circ} 13.5' E$ ) and Weligama Light House ( $05^{\circ} 58' N$ ,  $80^{\circ} 25.5' E$ ) to be  $43^{\circ}$ . The same moment Weligama Light House bore  $022^{\circ}(G)$  IE of the sextant was nil and the Gyro was reading  $1^{\circ}(H)$ . The vessel was steaming at 4 knots on a course to follow the East bound traffic lane of the traffic separation scheme off Dondra Head. A current was setting  $040^{\circ}(T)$  at four knots. The vessel continued on the same course till Great Basses Reef Light House was abeam to port.

Find the following,

- (i) Position of the vessel at 1000 hrs. ( 15 Marks)
- (ii) Compass course to steer counteracting the current ( 20 Marks)
- (iii) Speed made good along the proposed track ( 10 Marks)
- (iv) Time of Great Basses Reef Light House coming a beam to port side. ( 15 Marks)

16

13 4.5

$$\begin{array}{r} 103 \\ - 90 \\ \hline 013 \end{array}$$

$$\begin{array}{r} 90 \\ - 072 \\ \hline \end{array}$$

103

8





# 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 : 21<sup>TH</sup> December 2005

Time allowed THREE hours  
Answer ALL questions  
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) (a) Explain the followings -  
*Spring tides: At new moon and full moon the tide-raising forces of both Moon & Sun act conjointly, the tides resulting on these occasions are known as Spring Tides.*

- (i) Spring and neap tides
- (ii) Chart datum

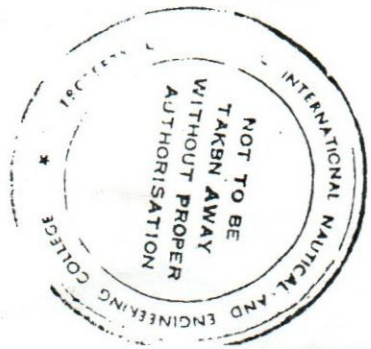
(b) Find the latest time on 21<sup>st</sup> December to cross a bar at Lowestoft, England (52° 28' N; 001° 45' E) which has a charted depth of 8 m, with a maximum draft of 8.2 m.  
It is advised to maintain under keel clearance of 2m.

(02) Sketch/write and show the chart symbols for followings -

- (i) Submarine Pipe line for oil.
- (ii) Radio direction finding station.
- (iii) Reporting Point showing the general direction of traffic flow.
- (iv) Tide rips.
- (v) Nature of sea bed clay.

(03) You are on board a container carrier, intended to sail from Bishop Rock (49° 52.5' N; 006° 27' W) towards Cherbourg pilot boarding grounds (49° 45' N; 001° 39' W). If the speed of the vessel is 19 kts.

(i) Plan the intended passage and clearly plot the courses with all the standard information, on the Chart provided.





- (ii) What are the methods adoptable for position fixing en-route?
- (iii) If your ETD Bishop's rock is on 21<sup>st</sup> December, 1999 1200 hrs. Calculate the rate and drift of tidal streams you expect to encounter on the passage.
- (iv) Calculate the ETA Cherbourg considering the effect of tidal streams.

(04)

(a) Explain the Mercator and Gnomonic Projections used to generate Navigation charts

(05)

(b) It is required to round Lizard Point (49° 58' N; 005° 12' W) maintaining a minimum distance off the light of 2.0 miles. Find the vertical Danger angle to set on a sextant, which has an index error of 2' (off) to observe Lizard Point light house. Speed of the ship 14 knots  
(Consider the height of the light as 70 m after applying the Tide).

While on the intended passage Lizard Point light house observed to have a vertical Sextant angle of 0° 57' and at the same time a bearing of 330° (C)

- (i) find the position of the vessel
- (ii) If a current sets 185° (T) at 3 Kts. Find the compass course to steer to pass Start Point 7 miles off

(05)

At 0800 hrs in poor visibility, from a vessel steering 181° (G) at 5 kts the Longship Lt (50° 05' N, 5° 40' W) bore 148° vessel continued on this course, and at 0915 hrs Wolf Rock Lt. (49° 57' N' 005° 40' W) was observed to bear 160° (G). If a tide sets 127° (T) at 2 kts throughout, find the vessel's position at 0915.  
Gyro error 1° High.

181 148  
127  
127

✳️ (8) (9)

CINEC MARITIME COUNCIL  
To Be Taken  
Away Without  
Penalty

**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 : 12 th May 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) Reporting point with the general direction of traffic flow. 

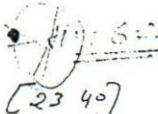
(ii) A coastline liable to inundation at high tide.

(iii) Submerged wreck over which the exact clearance is unknown but a clear safe depth known to be 20m over it , not dangerous to surface navigation. (20) w/c

(iv) Fishing stakes. TTTT

(v) A light vessel with a Racon and a sector light showing red , white and green in directions 315 - 000 , 000 - 180 and 180 - 235 respectively to a distance of 20M , 15 M and 20M . Also fitted with a siren sounded every five seconds .

( 04 Marks each )

(2) Find the latest time on 12 th May 1999 to pass under the London Bridge , England ( Lat. 51° 30' N , Long. 000° 05' W ) with an air draft of 28 metres . Required to have a clearance of 3.5 metres beneath the bridge for safe passing . At the highest tidal level for the day the air draft between the bridge and water level is 29 metres . Assume that the vessel has ample under keel clearance throughout the day .   
[23 40]

( 25 Marks )

(3) Your vessel was awaiting orders near Parsons Bank ( 48° 25' N , 006° 35' W ) in depth of around 99 metres . Orders received at 0900 hrs . , on 12 th May to proceed to Southampton ( 50° 53' N , 001° 23' W ) for loading .

(i) Propose a route to reach the destination clearly giving the 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 and their degree of accuracy / reliability ( 25 Marks )

Contd...../2

291

12<sup>th</sup> 2105 = 5.9  
13<sup>th</sup> 0342 = 1.0  
0637 = 4.95  
1.2



(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 true course to steer between EC 1 Light Buoy (  $50^{\circ} 06' N$ ,  $001^{\circ} 49' W$  ) and Needles Point boarding ground (  $50^{\circ} 37' N$ ,  $001^{\circ} 40' W$  ), if the vessel experienced a current of 270 (T) at the rate of 4 knots during that leg .  
( 10 Marks )

334

(4) A vessel steering  $090^{\circ}$  (T) at 16 knots observed Bishop Rock (  $49^{\circ} 52.5' N$ ,  $006^{\circ} 27' W$  ) light to bear  $332^{\circ}$  (G) at 1400 hrs. Next observation 30 minutes later was of the Wolf Rock (  $49^{\circ} 57' N$ ,  $005^{\circ} 49' W$  ) gave a value of  $028^{\circ}$  (G). A tidal stream was setting in the direction of  $190^{\circ}$  (T) at 4 knots throughout . The gyro was known to be 2 L .

Find the following ,

(i) Position of the vessel at 1430hrs. ✓ ( 15 Marks )

(ii) The 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  $90^{\circ}$  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  $053^{\circ}$  (G) at the same time . ( The Gyro was 2° High ) The vessel intends to pass Eddystone Rocks Light (  $50^{\circ} 11' N$ ,  $004^{\circ} 16' W$  ) , 10 miles off on the port side while counteracting a current of 3 knots setting  $045^{\circ}$  (T) . The vessel is steaming at 16 knots .

Required to calculate the following ,

(i) Position of the vessel at 1200 hrs. ( 08 Marks )

(ii) Compass course to steer to pass the Eddystone Rocks Light as intended . ( 12 Marks )

(iii) Time of Eddystone Rocks Light coming abeam on the port side . ( 10 Marks )



Navigation Class V  
11 Survey Masters (Masters)  
2 subject have

**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 : 15<sup>th</sup> September 2008 , 0930 Hrs to 1230 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 .

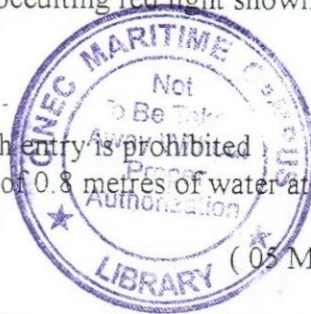
(ii) A light fitted with a Racon and having an occulting red light shown to a distance of eight miles .

(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 13<sup>th</sup> 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 )

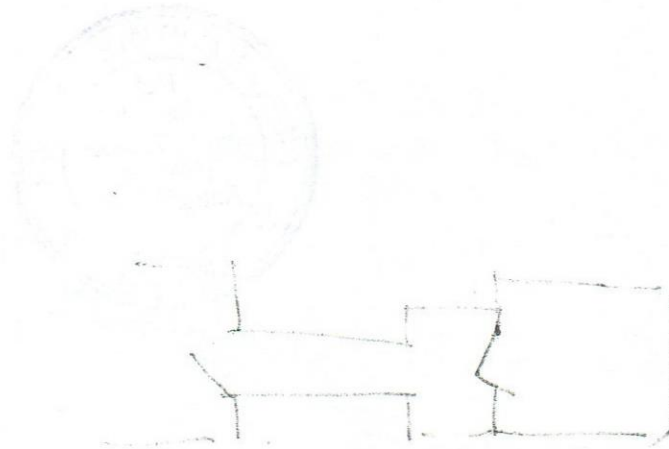
(c) Compass course steered between Dondra Head and Galle Light house . ( 15 Marks )

(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  $63^\circ$ . At the same instant the Point De Galle Light bore  $337^\circ$  (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)





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

**CERTIFICATE OF COMPETENCY EXAMINATION.**

**GRADE : OFFICER IN CHARGE OF A NAVIGATIONL WATCH  
ON SHIPS OF LESS THAN 500 GT (NCV)**

**SUBJECT : GENERAL SHIP KNOWLEDGE**

**DATE : 27.04.2006 1300 Hrs. To 1600 Hrs.**

Time allowed THREE hours.

Total marks 200

Answer ALL questions.

Pass mark 70%

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

**SECTION I**

(1) Write short notes on the following :

- |                  |                      |
|------------------|----------------------|
| (a) Head Reach.  | (b) Angle of Repose. |
| (c) Dead Weight. | (d) Squat.           |
| (e) Load Density |                      |

(04 Marks each)

(2) A boxed shaped vessel 20m x 6m x 2.5m floats at a draft of 1.5m in water of density 1013 kg /m<sup>3</sup>. Find the displacement of the vessel in tonnes and the height of the centre of buoyancy above the keel. *182 345 1511*

(15 Marks)

(3) i) Sketch and name the components of a stockless anchor.

(15 Marks)

ii) List the factors to be considered when deciding the amount of cable to be used prior to dropping the anchor.

(10 Marks)

iii) With the use of a diagram, illustrate how the third joining shackle of the anchor cable is marked.

(05 Marks)

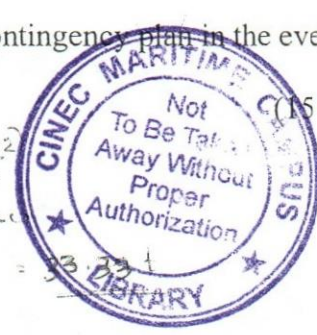
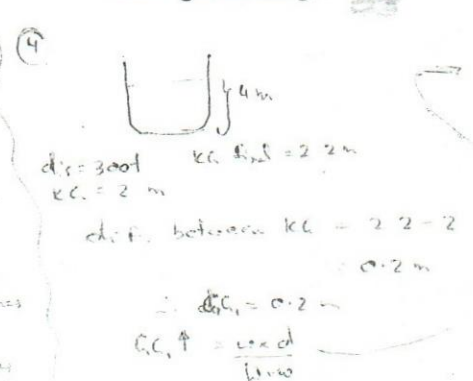
(4) A vessel having a displacement of 300 tonnes has a KG of 2.0m. She has to load a cargo of timber at a height of 4.0m above the keel. Find how much of cargo she can load to finish with a KG of 2.2m. *182 345*

(20 Marks)

(5) List the items that could be included in to the contingency plan in the event of a vessel grounding. *33*

(15 Marks)

*K<sub>CB</sub> = 1.5 m*  
*= 0.75 m*  
*W = 1000 kg*  
*1013 kg / m<sup>3</sup>*  
*20*  
*2.5*  
*132340 kg*  
*= 132340 tonnes*  
*1000*  
*= 132.34 tonnes*





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GOVERNMENT OF SRI LANKA**

**CERTIFICATE OF COMPETENCY EXAMINATION**

**GRADE : OFFICER INCHARGE OF A NAVIGATIONAL WATCH  
ON SHIPS OF LESS THAN 500 GT (NCV)**  
**SUBJECT : COASTAL NAVIGATION.**  
**DATE : 27<sup>th</sup> April 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) Pilot Boarding place
  - ✓(ii) Nature of sea bed having Clay and Mud.
  - ✓(iii) An underwater obstruction with the depth known by wire drag.
  - ✓(iv) A light house with a structural height of 15 m and fitted with a red light flashing every 15 seconds, visible up to 14 Miles.
  - (v) A light vessel with a Racon and a white light visible for 15 miles and group flashing three every 10 seconds.
- (04 marks each)
- (02) Find the earliest time on 29<sup>th</sup> July 1999 to cross a bar at Elephant Point, Mianmar ( Lat. 16° 29' N; Long. 096° 18'E ) fulfilling the following requirements. Vessel is having a draft of 2.8m. Vessel is required to maintain at least 1.0 m under keel clearance. The charted depth at the entrance is known to be 0.2m
- (25 marks)
- (03) At 1200 hrs, a vessel in position 12.5 miles due south from Dondra Head has to proceed to position 06 07' N; 081 08.4' E ( Off Hambanthota ). Ship can steam at 8 knots. Draft of the vessel is 3.5 m.
- (i) Find the position of the vessel at 1200 hrs.  
(05 marks)
  - (ii) Plan a safe passage to reach the given position, giving reasons for choosing your intended track.  
(25 marks)
  - (iii) ETA at the destination.  
(10 marks)

1725



(04) An observer on board a vessel measured the horizontal sextant angle between Great Basses Reef and Dorawa Point as 085. At the same time, the Great Basses Light House bore 058 (G). The ship's Gyro was 3 (H). Find the position of the vessel at the time of observation.

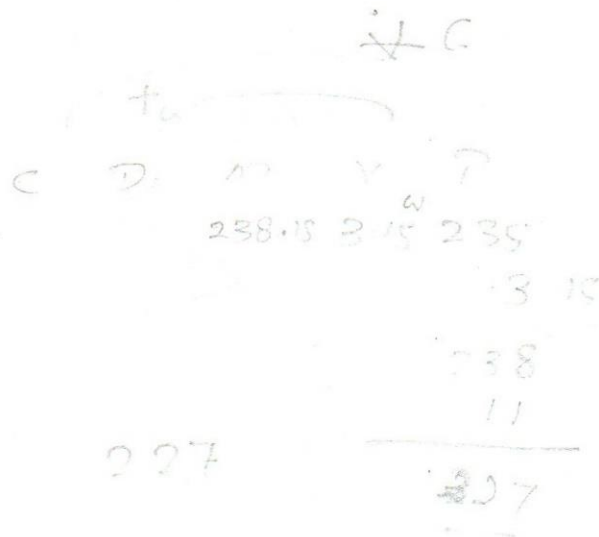
( 25 marks )

(05) While your vessel was steaming at 12 knots, off Hambanthota, the Hambanthota Point was observed to bear 340 (T) x 5.0. The vessel was making good a course of 246 (T) while experiencing a current of 3 knots in a direction of 030 (T). The vessel experienced the same conditions throughout and steered the same course until Dondra head was abeam to starboard.

Find the following;

- (i) Position of the vessel at the first observation. ( 05 marks )
- (ii) Compass course steered. ( 15 marks )
- (iii) Speed made good during the period. ( 10 Marks )
- (iv) The actual position of the vessel when Dondra Head is abeam to starboard. ( 10 marks )

06/5023/N



0713  
0117  
-----  
7

240  
90  
-----  
330



# DIRECTORATE OF MERCHANT SHIPPING

GOVERNMENT OF SRI LANKA.

CERTIFICATE OF COMPETENCY EXAMINATION.

GRADE : OFFICER IN CHARGE OF A NAVIGATIONAL WATCH  
ON SHIPS OF LESS THAN 500 GT (NCV)

SUBJECT : GENERAL SHIP KNOWLEDGE

DATE : 29.05.2005 0900 Hrs. To 1200 Hrs.

Time allowed THREE hours.  
Answer ALL questions.

Total marks 200  
Pass mark 70%

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

## SECTION I

(1) Write short notes on the following :

- (a) Stopping distance of a vessel. (b) Stability.  
(c) Load lines. (d) ~~GRT.~~  
(e) Squat.

(05 Marks each)

(2) (i) Sketch describe the rigging of a single swinging Derrick naming its components. (10 Marks)

(ii) Explain how you decide if a wire of a cargo lifting gear needs replacing

(10 Marks)

(3) A ship 120m x 17m x 10m has a block coefficient of 0.800 and is floating at the load summer draft of 7.2m in fresh water. Find how much more cargo can be loaded to maintain the same draft in salt water.

293.76 (15 Marks)





6.714

(4) A ship arrives at a port with a displacement of 4250T and KG of 5.96 m. She then Loads 520T at KG 6.3m, 1250T at KG 4.2m, 810 T at KG 11.6m. She also discharges 605T from KG 2.4m. Find her present KG.

(20 Marks)

(5) (i) Explain the inspections and preparations of holds, for loading Dry cargo.

(10 Marks)

(II) What methods can be employed for segregation of different types of cargo loaded in the same hold?

(10Marks)

Head 2000

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

**CERTIFICATE OF COMPETENCY EXAMINATION**

GRADE : OFFICER IN CHARGE OF A NAVIGATIONAL  
WATCH ON SHIPS OF LESS THAN 500 GT (NCV)

SUBJECT : GENERAL SHIP KNOWLEDGE

DATE : 14<sup>th</sup> September 2004 , 0900 hrs. to 1200 hrs.

Time allowed THREE hours.

Total Marks 200

Answer ALL questions.

Pass Marks 70 %

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

SECTION I

(1) Write short notes on the following.

(a) Reserve Buoyancy

(b) Moulded Depth

(c) After Perpendicular

(d) Load displacement

(e) Statutory Freeboard

*The line drawn to the water line is when the aft of rudder post meets the summer load line.*

*It is the total measurement of a ship, when she is floating in salt water her summer load line - when the water surface is level. When a vessel is loaded to her summer load line the vertical distance between summer load line and uppermost continuous deck.*

(2) Sketch and clearly name the components in the construction of a double bottom tank . Give prominence to the strengthening arrangements and the connections separately to,

(a) Transverse framing

(b) Longitudinal framing

( 25 Marks )

(3) A vessel arrives in a port with a displacement of 7000 tonnes and KG 7.0 m.

She then discharges and loads as follows .

Discharges 800 tonnes - KG 5.0 m , 250 tonnes - KG 4.2 m ,

300 tonnes - KG 8.5 m , 400 tonnes - KG 7.5 m

Loads 350 tonnes - KG 8.0 m , 450 tonnes - KG 5.0 m ,

500 tonnes - KG 3.0 m

Also replenishes Bunkers 600 tonnes - KG 1.0 m and Fresh water 100 tonnes -

KG 7.5 m . At departure from the port the vessel had a final KM of 9.0 m.

Find the departure GM of the vessel . *2.62m*

( 25 Marks )

(4) Write short notes on the following .

(a) Load Line Zones

(b) ILO

(c) IMO

(d) FAL Convention

(e) MARPOL 73/78

( 05 Marks each )

Contd.....2/..





# DIRECTORATE OF MERCHANT SHIPPING

## GOVERNMENT OF SRI LANKA

### CERTIFICATE OF COMPETENCY EXAMINATION

GRADE : OFFICER IN CHARGE OF A NAVIGATIONAL  
WATCH ON SHIPS OF LESS THAN 500 GT (NCV)

SUBJECT : GENERAL SHIP KNOWLEDGE

DATE : 08<sup>th</sup> July 2003 , 0900 hrs. to 1200 hrs.

Time allowed THREE hours.

Total Marks 200

Answer ALL questions.

Pass Marks 50 %

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

### SECTION I

(1) Write short notes on the following.

- (a) STCW 1978 as amended 1995
- (b) MARPOL 73/78 as amended
- (c) SOLAS
- (d) ISPS Code
- (e) BC Code

( 05 Marks each )

(2) A vessel of 6,000 tonnes displacement has a KM of 7.2m and a KG of 6.7m. while floating in upright condition. A weight of 60 tonnes already on board is shifted transversely from port side to starboard side.

Find the following ,

- (a) Shift of Centre of Gravity
- (b) Resulting list to the starboard side

( 12 Marks )

( 13 Marks )

(3) A vessel having a displacement of 3,200 tonnes has a KG of 3.0m and KM of 5.5m. She then loads 5,200 tonnes of cargo at a KG of 5.2m . The vessel further loads deck cargo at a KG of 10m to complete the loading with a positive GM of 0.3m. Considering the free surface moment is negligible and KM to remain constant find the quantity of deck cargo loaded .

(25 Marks )

(4) In diagrams of longitudinal and transverse cross sections of a vessel show the following .

- |                                    |                      |
|------------------------------------|----------------------|
| (i) Length overall                 | (vi) Trim            |
| (ii) Length between perpendiculars | (vii) Camber         |
| (iii) Centre of floatation         | (viii) Flare         |
| (iv) Centre of Buoyancy            | (ix) Sheer Strake    |
| (v) Metacentre                     | (x) Summer Freeboard |

( 2.5 Marks each )

Contd.....2/..





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

**CERTIFICATE OF COMPETENCY EXAMINATION**

**GRADE : OFFICER IN CHARGE OF A NAVIGATIONAL WATCH**  
**ON SHIPS OF LESS THAN 500 GT ( NCV )**

**SUBJECT : COASTAL NAVIGATION**

**DATE : 07<sup>th</sup> July 2003 , 0900 hrs. TO 1200 hrs.**

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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 .

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- (1) Sketch/Write and show the chart symbols for the following as per Chart 5011,  
(i) Coast line that inundates during low water.  
(ii) A draw bridge  
(iii) Nature of sea bed rock and pebbles .  
(iv) Light vessel with a racon and a light visible for 15 miles and group flashing three every ten seconds .  
(v) Area with fishing stakes and entry prohibited.
- ( 05 Marks each )

- (2) Find the earliest time on 07<sup>th</sup> July 1998 to cross a bar at Chittagong , Bangla Desh ( Lat. 22° 20' N , Long. 091° 50' E ) for vessel having a draft of 4.0m . It is advised to maintain an under keel clearance of 1.8m. The charted depth at the bar was known to be 2.5 m .
- ( 25 Marks )

- (3) Your vessel is anchored 2.0' miles due South of Rasamunai Point ( 05° 57.0' N , 080° 25.0' E ) awaiting orders . At 0900 hrs. you are advised to proceed to Pulmudai for loading Rutile Sand. Your vessel can make 10 knots and draws 4.0 metres. She is equipped with Radar , Magnetic compass , Gyro Compass Auto Pilot , Course recorder , Echo sounder , GPS and Barometer . Draw up your passage plan until you pass three miles South of Little Basses Reef Light House ( 06° 24.5' N , 081° 44' E ) .  
Find the following .
- (a) Position of the vessel at 0900 hrs. ( 05 Marks )  
(b) Explain your passage to reach the given position , giving reasons for choosing the proposed track . ( 25 Marks )  
(c) ETA at three miles South of Little Basses Light . ( 10 Marks )

Contd.../2



(4) At 1100 hrs. an observer at sea read the horizontal sextant angle between Tangalle Point ( $06^{\circ} 01.0' N$ ,  $080^{\circ} 48.0' E$ ) and Rekawa ( $06^{\circ} 02.5' N$ ,  $80^{\circ} 51.6' E$ ) as  $42^{\circ}$ . At the same time Rekawa Point bore  $002^{\circ}(G)$ . IE of the sextant was nil and the Gyro was reading  $2^{\circ}(H)$ . The vessel was steaming at 12 knots on a course of  $242^{\circ}(G)$ . The vessel was proceeding to Weligama Bay through the traffic separation scheme South of Dondra Head. One hour later Nilewelli Point ( $05^{\circ} 57.5' N$ ,  $080^{\circ} 43.2' E$ ) was observed to bear  $008^{\circ}(T)$ .

Find the following,

- (i) Position of the vessel at 1100 hrs. ( 10 Marks )
- (ii) Position of the vessel at 1200 hrs. ( 10 Marks )
- (iii) Speed made good along the proposed track ( 05 Marks )
- (iv) Course made good. ( 05 Marks )
- (v) Compass course made good ( 10 Marks )
- (vi) Direction and the rate of the current experienced ( 05 Marks )
- (vii) Gyro course to steer along the proposed track counteracting the current ( 15 Marks )



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

**CERTIFICATE OF COMPETENCY EXAMINATION**

GRADE : OFFICER IN CHARGE OF A NAVIGATIONAL  
WATCH ON SHIPS OF LESS THAN 500 GT (NCV)

SUBJECT : GENERAL SHIP KNOWLEDGE

DATE : 23<sup>rd</sup> December 2003 , 0900 hrs. to 1200 hrs.

Time allowed THREE hours.

Total Marks 200

Answer ALL questions.

Pass Marks 50 %

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

**SECTION I**

(1) Define / Identify the following.

- ✓(a) Metacentre
- ✓(b) Synchronous Pitching.
- ✓(c) MARPOL 1978.
- ✓(d) Beaufort Scale.
- ✓(e) Squatting.

( 05 Marks each )

(2) A ship of 1500 tonnes Displacement has KB 2.1m, KG 2.7m and KM 3.1m is floating upright in salt water. Find the list if a weight of 10 tonne is shifted transversely across the deck through a distance of 10m.

$$\tan \theta = \frac{w d}{w_{gn}}$$

(25 Marks)  $\frac{10 \times 10}{1500 \times 2.5}$

(3) A ship 120m long , 15m beam has a block coefficient of 0.700 and is floating at a loaded draft of 7.0m in fresh water. Find how much more cargo can be loaded if the ship is to float at the same draft in salt water.

(25 Marks)

(4) (i) Sketch and name the components of a stockless anchor?

(15 Marks)

(ii) List the main parts of the anchor cable and explain the markings which has to be, on the cable.

(15 Marks)

Contd.....2/..





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

**CERTIFICATE OF COMPETENCY EXAMINATION**

**GRADE : OFFICER IN CHARGE OF A NAVIGATIONAL  
WATCH ON SHIPS OF LESS THAN 500 GT (NCV)**

**SUBJECT : GENERAL SHIP KNOWLEDGE**

**DATE : 30<sup>th</sup> July 2002 , 0900 hrs. to 1200 hrs.**

Time allowed **THREE** hours.

Total Marks **200**

Answer **ALL** questions.

Pass Marks **50 %**

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

**SECTION I**

(1) Write short notes on the following.

- (a) Centre of Floatation
- (b) IMDG Code New Version
- (c) Designated Person
- (d) Metacentric Height
- (e) BIMMS Agreement

( 05 Marks each )

(2) A vessel displaces 7400 tonnes and has a KG of 6.5 m. A Locomotive weighing 100 tonnes has to be lifted off the quay using a derrick on board. The head of the derrick when the load is lifted will be placed at 25 m above the keel and 12 m starboard of the centre line. Find the position of the centre of gravity when the locomotive is hanging at the derrick head.

( 25 Marks )

(3) A ship is loading at an upriver port, where the R.D. of the water is 1.006. Her present freeboard measures 1905 mm. Her Summer Freeboard is 1856 mm. Fresh water allowance is 148 mm and TPC is 18.62 tonnes. During the voyage down river the vessel consumes 29 tonnes of fuel/stores and freshwater. Find how much more cargo she can load to be at her summer load line when she enters saltwater.

( 25 Marks )

(4) Sketch and explain the " Plimsoll Mark " and Load Lines as seen on a side of a merchant ship. Give the details of general dimensions and the applications.

( 25 Marks )

Contd.....2/..



**SECTION II**

Answer all questions. Every question carries 04 marks.  
Choose the correct answer from the answers given.

---

1) What is a Cumulative List ?

.....  
.....

2) What is the use of Annual Summary of Notices to Mariners ?

.....  
.....

(3) What information do you find in the Mariner's Handbook ?

- (i).....
- (ii).....
- (iii).....
- (iv).....

(4) Corrections to be applied to a Mercury Column Barometer are ,

.....  
.....

(5) The Tropical Cyclones in the Bay of Bengal Region ,

- (i) Take a Westerly path before re-curving
- (ii) Take an Easterly path before re-curving
- (iii) Follow a northerly track at all times .
- (iv) Remain stationary most of the time .

(6) The best anchor to use on board a merchant ship is ,

- (i) Stockless Anchor
- (ii) Danforth Anchor
- (iii) Admiralty Pattern Anchor
- (iv) Plough Anchor

(7) If I am within the navigable semi circle of a cyclone I will ,

.....  
.....  
.....

(8) Define a Near Coastal Voyage under BIMMS Conference .

.....  
.....  
.....

(9) The Certificate issued to a vessel as per ISM code is ,

- (i) .....
- (ii) .....

(10) GMDSS communications should be installed on ships of ,

.....

(11) An Echo sounder works on the principle of ,

.....  
.....  
.....

(12) The error of perpendicularity on a sextant occurs when ,

.....  
.....

(13) During Middle watch 8 bells sounded at

- (i) 0800 hrs.                      (ii) 1000 hrs.
- (iii) 1200 hrs.                    (iv) 1400 hrs.

(14) What are the methods of segregation recommended in the IMDG Code ?

- (i) .....
- (ii) .....
- (iii) .....
- (iv) .....

(15) Rat guards are placed on board a moored vessel to ,

.....  
.....

(16) The scope of the anchor is decided on the following factors .

- (i) .....
- (ii) .....
- (iii) .....
- (iv) .....





(17)What are the advantages of having a Union Purchase Rig , against a single Swinging Derrick .

- (i).....
- (ii).....
- (iii).....
- (iv).....

(18)What precautions would you take before accepting Hazardous Cargo on board ?

- (i).....
- (ii).....
- (iii).....
- (iv).....

(19)The ideal months for the SW Monsoon are ,

.....

(20)The Sun's heat is transferred to the Earth by following methods .

- (i)..... (ii).....
- (iii)..... (iv).....

(21)Winds of 28-33 knots termed as ..... winds as per the Beaufort scale .

(22)An anticyclone is the name given to a system of .....  
The wind circulation will be .....in the Northern Hemisphere .

(23)Name given to a tropical revolving storm in the

- (i)Eastern side of South Indian Ocean is .....
- (ii)Western side of the South Indian Ocean is .....

(24)As per IMDG code all hazardous substances are divided into .....  
basic categories .

(25)Pyrotechnics carried on board are as follows .

On Bridge .....

On Life boats .....

.....  
.....

Class 8

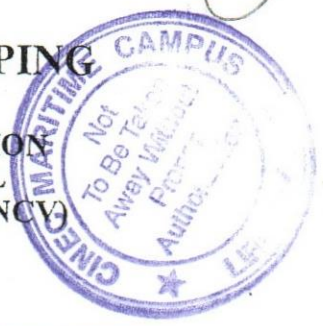
**DIRECTORATE OF MERCHANT SHIPPING  
GOVERNMENT OF SRI LANKA**

**CERTIFICATE OF COMPETENCY EXAMINATION**

GRADE : OFFICER IN CHARGE OF A NAVIGATIONAL  
WATCH ON SHIPS OF LESS THAN 500 GT (NCV)

SUBJECT : GENERAL SHIP KNOWLEDGE

DATE : 30th July 2002, 0900 hrs. to 1200 hrs.



Time allowed THREE hours. Total Marks 200  
Answer ALL questions. Pass Marks 50 %  
Formulae and all intermediate steps taken in reaching your answer should be clearly shown. You may draw sketches where ever required.

**SECTION I**

(1) Write short notes on the following.

- (a) Centre of Floatation - *When the buoyancy is equalled to the weight and the body is floating freely*
- (b) IMDG Code New Version
- (c) Designated Person
- (d) Metacentric Height
- (e) BIMMS Agreement

(05 Marks each)

(2) A vessel displaces 7400 tonnes and has a KG of 6.5 m. A Locomotive weighing 100 tonnes has to be lifted off the quay using a derrick on board. The head of the derrick when the load is lifted will be placed at 25 m above the keel and 12 m starboard of the centre line. Find the position of the centre of gravity when the locomotive is hanging at the derrick head.

*CG = 0.33* (25 Marks)

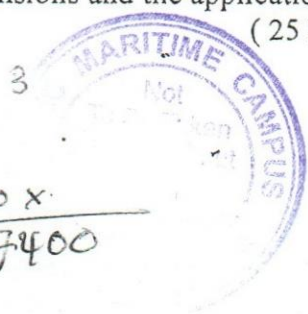
(3) A ship is loading at an upriver port, where the R.D. of the water is 1.006. Her present freeboard measures 1905 mm. Her Summer Freeboard is 1856 mm. Fresh water allowance is 148 mm and TPC is 18.62 tonnes. During the voyage down river the vessel consumes 29 tonnes of fuel/stores and freshwater. Find how much more cargo she can load to be at her summer load line when she enters saltwater

*1905 - 148 = 1757*  
*1757 - 1856 = -99*  
*18.62 - 29 = -10.38*  
*10.38 - 99 = -88.62*  
*88.62* (25 Marks)

(4) Sketch and explain the "Plimsoll Mark" and Load Lines as seen on a side of a merchant ship. Give the details of general dimensions and the applications.

(25 Marks)

Contd.....2/..



$$FPC = \frac{A}{100} < PC$$

$$A = \frac{18.62 \times 100}{100}$$

$$2 - \frac{100 \times}{7400}$$

$$\frac{18.62 \times 100}{100}$$



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

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GRADE : OFFICER IN CHARGE OF A NAVIGATIONAL  
WATCH ON SHIPS OF LESS THAN 500 GT (NCV)

SUBJECT : GENERAL SHIP KNOWLEDGE

DATE : 30th July 2002, 0900 hrs. to 1200 hrs.

Time allowed THREE hours.

Total Marks 200

Answer ALL questions.

Pass Marks 50 %

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

**SECTION I**

(1) Write short notes on the following.

- (a) Centre of Floatation
- (b) IMDG Code New Version
- (c) Designated Person
- (d) Metacentric Height
- (e) BIMMS Agreement



(05 Marks each)

(2) A vessel displaces 7400 tonnes and has a KG of 6.5 m. A Locomotive weighing 100 tonnes has to be lifted off the quay using a derrick on board. The head of the derrick when the load is lifted will be placed at 25 m above the keel and 12 m starboard of the centre line. Find the position of the centre of gravity when the locomotive is hanging at the derrick head.

(25 Marks)

(3) A ship is loading at an upriver port, where the R.D. of the water is 1.006. Her present freeboard measures 1905 mm. Her Summer Freeboard is 1856 mm. Fresh water allowance is 148 mm and TPC is 18.62 tonnes. During the voyage down river the vessel consumes 29 tonnes of fuel/stores and freshwater. Find how much more cargo she can load to be at her summer load line when she enters saltwater.

(25 Marks)

(4) Sketch and explain the "Plimsoll Mark" and Load Lines as seen on a side of a merchant ship. Give the details of general dimensions and the applications.

(25 Marks)

Contd.....2/..

328.7

TOTAL



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

**CERTIFICATE OF COMPETENCY EXAMINATION**

GRADE : OFFICER IN CHARGE OF A NAVIGATIONAL  
WATCH ON SHIPS OF LESS THAN 500 GT (NCV)

SUBJECT : GENERAL SHIP KNOWLEDGE

DATE : 14<sup>th</sup> September 2004 , 0900 hrs. to 1200 hrs.

Time allowed THREE hours.

Total Marks 200

Answer ALL questions.

Pass Marks 70 %

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

SECTION I

(1) Write short notes on the following.

(a) Reserve Buoyancy ✓

(d) Load displacement ✓

(b) Moulded Depth ✓

(e) Statutory Freeboard ✓

(c) After Perpendicular ✓

( 05 Marks each )

(2) Sketch and clearly name the components in the construction of a double bottom tank . Give prominence to the strengthening arrangements and the connections separately to,

(a) Transverse framing

(b) Longitudinal framing

( 25 Marks )

(3) A vessel arrives in a port with a displacement of 7000 tonnes and KG 7.0 m . She then discharges and loads as follows .

Discharges 800 tonnes – KG 5.0 m , 250 tonnes – KG 4.2 m ,

300 tonnes – KG 8.5 m , 400 tonnes – KG 7.5 m

Loads 350 tonnes – KG 8.0 m , 450 tonnes – KG 5.0 m ,

500 tonnes – KG 3.0 m

Also replenishes Bunkers 600 tonnes – KG 1.0 m and Fresh water 100 tonnes – KG 7.5 m . At departure from the port the vessel had a final KM of 9.0 m .

Find the departure GM of the vessel . 2.62m

( 25 Marks )

(4) Write short notes on the following .

(a) Load Line Zones ✓

(e) MARPOL 73/78 ✓

(b) ILO

(c) IMO 1982-1992

(d) FAL Convention

( 05 Marks each )

Contd.....2/..

2.64

2

THE PRESIDENTIAL SECRETARIAT  
MERCHANT SHIPPING DIVISION

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

SUBJECT : GENERAL SHIP KNOWLEDGE  
DATE : 17 TH DECEMBER 1999 , 0930 hrs. TO 1230 hrs.

Time allowed THREE hours.

Answer ALL questions.

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

Total Marks 200

Pass Marks 50%

PART I

- (1) Write short notes on following.
- (a) Camber ✓ *Curvature of the deck in the transverse direction. met is ensure that shipped seas down of the deck as fast as possible*
  - (b) Load Lines ✓ *it is ronnage all space within the hull + all enclosed spaces above the waterline*
  - (c) Gross Tonnage ✓ *Calculate as per tonnage in*
  - (d) Metacentric Height ✓ *it is the vertical between the center of gravity and metacenter.*
  - (e) Reserve of Buoyancy ✓

(05 Marks each)

- (2) (a) Explain how you will identify a good weld against a poor one.  
(b) What are the factors governing the quality of a weld?  
(c) Compare the advantages of welding in modern ship building against riveting process practiced in early days.

(30 Marks)

- (3) A ship displaces 5000 cubic meters of salt water (density 1025 Kgs. per cu. m.) when floating at sea. Find the displacement in tonnes when the ship is floating at the same draft in water of density 1010 Kgs. per cu. m.

(20 Marks)

- (4) A box shaped vessel 50 m x 10 m x 05 m displaces 1500 metric tonnes of water. Find the draft when the vessel is floating in salt water of density 1025 Kgs./cu. m.

(25 Marks)



Contd.....2/..

*Under water VOL x density of display*

*1500 = 50 x 10 x 05 x 1025 x draft*  
*1500 = 2500 x 1025 x draft*  
*1500 = 2562500 x draft*  
*draft = 1500 / 2562500*  
*draft = 0.000585 m*



H.D.W. yns...

DIRECTORATE OF MERCHANT SHIPPING  
GOVERNMENT OF SRI LANKA

CERTIFICATE OF COMPETENCY EXAMINATION  
OFFICER IN CHARGE OF A NAVIGATIONAL  
WATCH ON SHIPS OF LESS THAN 500 GT (NCV)  
SUBJECT: GENERAL SHIP KNOWLEDGE  
DATE: 08<sup>th</sup> July 2003, 0900 hrs. to 1200 hrs.

Time allowed THREE hours.  
Answer ALL questions.  
Formulae and all intermediate steps taken in reaching your answer should be clearly shown. You may draw sketches where ever required.  
Total Marks 200  
Pass Marks 50%

SECTION I

- (1) Write short notes on the following.
  - (a) STCW 1978 as amended 1995 ✓
  - (b) MARPOL 73/78 as amended
  - (c) SOLAS
  - (d) ISPS Code
  - (e) BC Code

(05 Marks each)

(2) A vessel of 6,000 tonnes displacement has a KM of 7.2m and a KG of 6.7m while floating in upright condition. A weight of 60 tonnes already on board is shifted transversely from port side to starboard side. 10

- (a) Shift of Centre of Gravity 0.1
- (b) Resulting list to the starboard side 11.3

(12 Marks)  
(13 Marks)

orig 119 67  
 $GHI = \frac{Wd}{W}$   
 $60 = \frac{60 \times 10}{6000}$

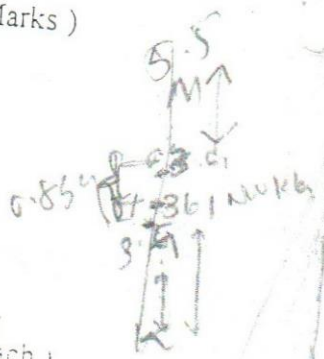
(3) A vessel having a displacement of 3,200 tonnes has a KG of 3.0m and KM of 5.5m. She then loads 5,200 tonnes of cargo at a KG of 5.2m. The vessel further loads deck cargo at a KG of 10m to complete the loading with a positive GM of 0.3m. Considering the free surface moment is negligible and KM to remain constant find the quantity of deck cargo loaded.

(25 Marks)

(4) In diagrams of longitudinal and transverse cross sections of a vessel show the following.

- (i) Length overall
- (ii) Length between perpendiculars
- (iii) Centre of floatation
- (iv) Centre of Buoyancy
- (v) Metacentre
- (vi) Trim
- (vii) Camber
- (viii) Flare
- (ix) Sheer Strake
- (x) Summer Freeboard

466 69



Contd.....27..... (2.5 Marks each)

2 v.p. done ✓  
d/s  
an





Colombo International Nautical and Engineering College

CINEC CAMPUS

Faculty of Maritime Sciences

Department of Navigation

EDUCATION & TRAINING COURSE: Navigation Cadet Training Program - Phase V

OOW > 500GT / OOW < 500GT

1. meteorology
2. Maths
3. General-ship knowledge
- 4 Bridge equipment
5. Applied science



COURSE CODE: ND-100 PV / ND-115 / ND-103

CERTIFICATE OF COMPETENCY EXAMINATION  
**GENERAL SHIP KNOWLEDGE**

- Answer all questions.
- Total Marks: 150

Date: 17.10.2013

Pass mark 50%

Time allocated: 03 Hours

1) A vessel is initially displacing 6440 t and has following particulars:

KG = 9.40 m

KM = 10.56 m (Assume constant)

A 70 t transformer is to be discharged from a position on the centerline, KG 7.4 m using the vessel's own heavy lift crane. The crane head is 42 m above the keel. The transformer will be landed shore to a position 12 m off the vessel's centerline.

a) Calculate the vessel's GM for each of the following:

- i) When the weight is lifted just clear of it's initial stowage position;  
(7 marks)
- ii) When the weight is finally discharged ashore  
(7 marks)

b) Calculate maximum angle of list during the operation

(6 marks)

c) Roughly mark the positions of G, G<sub>1</sub>, G<sub>2</sub> and G<sub>3</sub> on the same transverse cross section for the above situation.

Where;

G = COG of the vessel before any movement of the cargo

G<sub>1</sub> = COG of the vessel once the weight is taken by the derrick but still on the centre line

G<sub>2</sub> = COG of the vessel when the derrick is swung to the discharging position

G<sub>3</sub> = COG after discharging

(05 marks)

2) a) Derive the following formula;

$$\text{Change Of Trim} = \frac{\text{Trimming moment}}{\text{MCTC}}$$

(05 marks)

b) A ship floating with a draught fwd 7.9 m and aft 10.4 m have following hydrostatic particulars;

LBP = 125 m

MCTC = 318 tm

TPC = 28 tcm<sup>-1</sup>

COF = at amidships

Find the final draughts fwd and aft after the following cargo operations have been carried out;

500 t loaded in No: 2 LH 40 m fwd of amidships

200 t loaded in No: 5 TD 50 m aft of amidships

100 t of SW transferred from AP tank to FP tank, through a distance of 110 m

(20 marks)

3) a) Derive the following formula:

$$\text{TPC} = \text{Water plane area} \times \text{density} / 100$$

(05 marks)

b) List down five hydrostatic particulars of a ship

(05 marks)

c) A vessel floats in DW RD 1.016 with her winter load line 100 mm below water on the port side and 180 mm below water on the starboard side. If her FWA is 200 mm, TPC is 24 and summer load draft is 9.6 m, find DWT available.

(15 marks)

4) Briefly Explain the following terms (use diagrams if required)

a) LCF

b) Righting moment

c) Unstable equilibrium

d) Stiff ship

e) Free surface effect

(05 marks each)

5) a. With an aid of a labeled sketch, describe a transversely framed vessel.

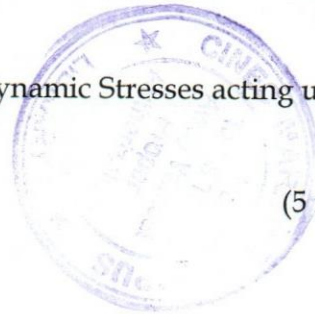
(15 marks)

b. Briefly explain the following Dynamic Stresses acting upon a vessel due to wave bending moment.

a) Racking.

b) Sagging.

(5 marks each)



- 6) a. Explain the use of Sacrificial Anode technique to minimize Electro Chemical corrosion (10 marks)
- b. Describe the following constructional features of a ship.
- a) Camber
  - b) Flare
  - c) Rise of floor (5 marks each)





KRISHANITHA  
NETTICORWA

## DIRECTORATE OF MERCHANT SHIPPING GOVERNMENT OF SRI LANKA

### CERTIFICATE OF COMPETENCY EXAMINATION

GRADE : OFFICER IN CHARGE OF A NAVIGATIONAL  
WATCH ON SHIPS OF LESS THAN 500 GT (NCV)

SUBJECT : GENERAL SHIP KNOWLEDGE

DATE : 25th September 2001, 0900 hrs. TO 1200 hrs.

Time allowed THREE hours.

Total Marks 200

Answer ALL questions.

Pass Marks 50 %

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

### SECTION I

(1) Write short notes on the following.

- (a) Net Tonnage
- (b) SOLAS
- (c) ISM Code
- (d) STCW Convention
- (e) Deadweight

(05 Marks each)

(2)(a) A vessel displaces 5800 tonnes. Her KM is 7.0 m and KG is 6.0 m. She has to complete loading to end up with a GM of 0.75 m. The load has to be placed at a KG of 11.0 m. Find the quantity of cargo to be loaded.

(25 Marks)

(3) A vessel of triangular shape has following dimensions. Length - 100 m, Beam - 12 m, Depth - 6 m. She displaces 3030 tonnes in water of density 1.010. Find her reserve buoyancy.

(25 Marks)

(4)(i) Draw and explain a union purchase rig utilized for cargo handling.

(15 Marks)

(ii) What are the markings displayed / engraved on different components.

(04 Marks)

(iii) What routine maintenance is carried out on board for such gear?

(30 Marks)

i) On the boom

max. SWL 5T / up. 1.6T SWL. MIN  $\angle$  30°

Blocks

Contd..... 2/..

|                      |
|----------------------|
| Makers name          |
| Block certificate No |
| SWL                  |
| Groove diameter      |

1) If there is a cabin to operate it should be cleared and glass must be cleaned.

2) The deck area of the working area must be free of grease & oil.

3) Make sure all the manila ropes are in good condition.

1) Make sure the SWL is clearly marked

2) " " "  $\angle$  are "

3) All the shackles, blocks are clearly marked with SWL.

4) Lubricate & grease all the shackles, blocks.

5) Goose neck should be greased & lubricated.

6) All the moving items must be free of rust.

7) The wires must be greased routinely & check for damages

8) The winches must be greased / lubricated

9) Wire on the winch must be free of kinks.

10) Brakes must be in good condition.

Shackles

SWL  
certificate No

(1) (2)

17/10/00

**MINISTRY OF SHIPPING AND SHIPPING DEVELOPMENT**  
**MERCHANT SHIPPING DIVISION**

**CERTIFICATE OF COMPETENCY EXAMINATION**  
GRADE : **OFFICER IN CHARGE OF A NAVIGATIONAL**  
**WATCH ON SHIPS OF LESS THAN 500 GT (NCV)**

SUBJECT : **GENERAL SHIP KNOWLEDGE**

DATE : **23 RD OCTOBER 2000**, 0900 hrs. TO 1200 hrs.

Time allowed **THREE** hours.

Total Marks **200**

Answer **ALL** questions.

Pass Marks **50 %**

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

(1) Write short notes on the following.

- 1070*
- Int. Maritime*  
*Regulations Code*
- (a) Centre of Floatation
  - (b) Length between Perpendiculars
  - (c) IMDG Code
  - (d) Summer Freeboard
  - (e) Load Lines

(05 Marks each)

(2)(a) Sketch the panting and pounding arrangements in the foreward end of a vessel.

(b) Why the foreward end of a vessel is required to be strengthened in such a manner.

(25 Marks)

(3) A box shaped vessel of 60m x 30m x 06m displaces 2200 metric tonnes. Find the draft when this vessel is floating in sea water of R.D. 1.025.

*1.2* *1.19*

(20 Marks)

(4) A vessel of 8400 metric tonnes displacement floats in salt water of density 1025 Kgs. per cubic metre. She has to proceed to a berth where the dock water density is 1010 Kgs. per cubic metre. Find how much cargo she has to discharge if to maintain the same draft as before.

*122 92*

(30 Marks)

Contd.....2/..



(9)



MINISTRY OF SHIPPING AND SHIPPING DEVELOPMENT  
MERCHANT SHIPPING DIVISION

CERTIFICATE OF COMPETENCY EXAMINATION

GRADE : OFFICER IN CHARGE OF A NAVIGATIONAL  
WATCH ON SHIPS OF LESS THAN 500 GT ON  
NEAR COASTAL VOYAGES

SUBJECT : GENERAL SHIP KNOWLEDGE

DATE : 27 TH JUNE 2000 , 0900 hrs. TO 1200 hrs.

Time allowed THREE hours.

Answer ALL questions.

Total Marks 200

Pass Marks 50 %

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

(1) Identify / Define the following.

- (a) Metacentre
- (b) Plimsoll Mark
- (c) Lubber's Line
- (d) Length Overall
- (e) Centre of Buoyancy



(05 Marks each)

(2) Sketch and show the midship cross sectional area of a dry cargo vessel and a tanker highlighting the main differences between them. Give the reasons for such constructional features.

(30 Marks)

(3) A ship displaces 7500 cubic meters of salt water (density 1025 Kgs. per cu.m.) when floating at sea. Find the displacement in tonnes when the ship is floating at the same draft in water of density 1015 Kgs. per cu.m.

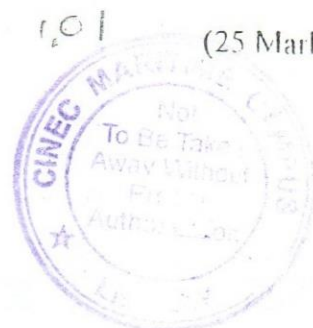
7573

(20 Marks)

(4) A box shaped vessel 24 m x 06 m x 03 m displaces 150 metric tonnes of water. Find the draft when the vessel is floating in salt water of density 1025 Kgs./cu.m.

(25 Marks)

Contd..... 2/..





3

74

(1)

**THE PRESIDENTIAL SECRETARIAT  
MERCHANT SHIPPING DIVISION**

GRADE : **CERTIFICATE OF COMPETENCY EXAMINATION  
OFFICER IN CHARGE OF A NAVIGATIONAL  
WATCH ON SHIPS OF LESS THAN 500 GT (NCV)**

SUBJECT : **GENERAL SHIP KNOWLEDGE**  
DATE : **04 TH APRIL 2000 , 0900 hrs. TO 1200 hrs.**

Time allowed **THREE** hours.

Total Marks **200**

Answer **ALL** questions.

Pass Marks **50 %**

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

(1) Identify / Define the following.

- (a) Panting
- (b) Angle of Repose
- (c) Reserve Buoyancy
- (d) IMDG Code
- (e) Centre of Gravity

(05 Marks each)

(2) Sketch and show a balanced rudder and its associated parts.  
Highlight the main differences against an unbalanced rudder.  
What are the advantages you could achieve on a vessel when fitted with a balanced rudder.

(25 Marks)

(3) A ship of 6,400 tonnes displacement floats in salt water. She has to proceed to a berth with density of 1,008 kgs. per cu.m Find how much cargo has to be discharged if she is to remain at the same salt water draft.

(25 Marks)

(4) A box shaped vessel 20 m x 06 m x 2.5 m floats at a draft of 1.5 m in water of density 1,013 kgs. per cu.m. Find the displacement in tonnes, and the height of the centre of buoyancy above the keel.

(25 Marks)



7

12

(2)

Hanshaa Panayyack

**THE PRESIDENTIAL SECRETARIAT  
MERCHANT SHIPPING DIVISION**

**CERTIFICATE OF COMPETENCY EXAMINATION**  
GRADE : **OFFICER IN CHARGE OF A NAVIGATIONAL  
WATCH ON SHIPS OF LESS THAN 500 GT (NCV)**

SUBJECT : **GENERAL SHIP KNOWLEDGE**

DATE : **17 TH DECEMBER 1999, 0930 hrs. TO 1230 hrs.**

Time allowed **THREE** hours.

Total Marks **200**

Answer **ALL** questions.

Pass Marks **50 %**

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

**PART I**

(1) Write short notes on following.

- (a) Camber
- (b) Load Lines ✓
- (c) Gross Tonnage
- (d) Metacentric Height
- (e) Reserve of Buoyancy

(05 Marks each)

- (2) (a) Explain how you will identify a good weld against a poor one.  
(b) What are the factors governing the quality of a weld?  
(c) Compare the advantages of welding in modern ship building against riveting process practiced in early days.

(30 Marks)

- (3) A ship displaces 5000 cubic meters of salt water (density 1025 Kgs. per cu. m.) when floating at sea. Find the displacement in tonnes when the ship is floating at the same draft in water of density 1010 Kgs. per cu. m.

(20 Marks)

- (4) A box shaped vessel 50 m x 10 m x 05 m displaces 1500 metric tonnes of water. Find the draft when the vessel is floating in salt water of density 1025 Kgs./cu. m.

(25 Marks)

Contd.....2/..

$$\begin{aligned} 1500 \text{ t} &= 50 \times 10 \times x \times 1025 \\ 1500 &= 500x \times 1025 \\ x &= 512.5 \\ x &= \frac{1500}{512.5} = 2.93 // \end{aligned}$$





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MERCHANT SHIPPING DIVISION

9/7/500

$TPC = \frac{1}{105} \times 1025$

CERTIFICATE OF COMPETENCY EXAMINATION  
GRADE : OFFICER IN CHARGE OF A NAVIGATIONAL  
WATCH ON SHIPS OF LESS THAN 500 GT  
SUBJECT : GENERAL SHIP KNOWLEDGE  
DATE : 18 TH JUNE 1999 , 0900 hrs. TO 1200 hrs.

$15.2 = \frac{1}{100} \times 1025$

Time allowed THREE hours  
Answer all questions  
Formulae and all intermediate steps taken in reaching your answer should be clearly shown  
Sketches to be shown whenever necessary

Total Marks 100  
Pass Marks 50 %

- (1) (a) Define "Light Displacement" and "Deadweight" (10 Marks)
- (b) A vessel having a light displacement of 3253 tonnes, displaces 8398 tonnes when loaded. Find the deadweight of the vessel. (5 Marks)
- (c) Find how much cargo that can be loaded additionally to float at summer marks if the summer deadweight is 6288 tonnes. (5 Marks)

- (2) A vessel has a mean draft of 7.36 M in dock water of 1.012 relative density. If the TPC at that draft is 15.2 t, find the new draft after loading 360 t and discharging 180 t. (20 Marks)

- (3) A vessel with 7800 t displacement has a KG of 5.4m. She has to load a cargo of timber at a height of 12m above the keel. Find how much cargo she can load to finish with a KG 6.2m. She consumes 130 t of fuel and fresh water during the passage. (20 Marks)

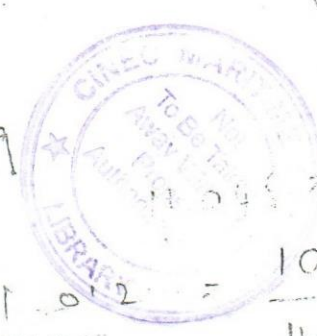
- (4) With the help of sketches explain by writing short notes.
  - (a) L. B. P. (Length Between Perpendiculars)
  - (b) L. O. A. (Length Overall)
  - (c) Moulded Breadth
  - (d) Flare
  - (e) Camber
 (3 Marks each)

- (5) Sketch an outline of strengthening arrangements in the forward area of a vessel. Explain why these arrangements are necessary. (25 Marks)

Handwritten notes on the left margin: "Ship Stability", "Strength", "Shipboard Techniques".

$D = \frac{M}{\rho}$

$1.012 = \frac{7.36 \times 1.01482}{15.00701}$



|            |
|------------|
| 360        |
| 180        |
| 180        |
| 10865.81   |
| 1489.9 x d |

7.2

2

Handwritten notes at the bottom left: "Shipboard Techniques", "Know-Edge".



**THE PRESIDENTIAL SECRETARIAT  
MERCHANT SHIPPING DIVISION**

**CERTIFICATE OF COMPETENCY EXAMINATION  
GRADE : OFFICER IN CHARGE OF A NAVIGATIONAL  
WATCH ON SHIPS OF LESS THAN 500 GT (NCV)**

**SUBJECT : COASTAL NAVIGATION**

**DATE : 16 TH DECEMBER 1999 , 0930 hrs. TO 1230 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) Find the available depth of water at a chartered depth of 7m at 1030 hrs. on 16 th December 1999 at port of Colombo, Sri Lanka .  
( 25 Marks )
- (2) Sketch / Write and show the chart symbols for the following as per Chart 5011 .  
(i) Location of an aeronautical radio beacon .  
(ii) A spindle buoy fitted a light flashing green every three seconds and having an entry prohibited area of two miles around it .  
(iii) A buoy fitted with a racon and a light flashing every five seconds giving a range of five miles .  
(iv) A single point mooring buoy with a light.  
(v) A traffic separation scheme showing the general direction of traffic, the prohibited zone and the inshore traffic area.  
( 05 Marks each )
- (3) After leaving Weligama bay , steaming @ 14 knots , at 1000 hrs. a vessel observed a horizontal sextant angle of  $45^{\circ} 5'$  between Rassamunai Point and Mirissa Point . The vessel intends to proceed to a point 5' off Kirinde Point . The sextant used for observation had an index error of  $5'$  on the arc.  
Find the following .  
(i) Position of the vessel at 1000 hrs.  
( 15 Marks )  
(ii) Propose a passage to reach 5' off Kirinde Point justifying reasons.  
Clearly plot the courses and the way points chosen en-route .  
( 25 Marks )  
(iii) Explain the methods of position fixing and the navigational equipment you could utilize during this passage.  
( 10 Marks )

Contd...../ 2



(4) While your vessel was steaming @ 12 knots off Hambantota the Hambantota Point was observed to bear  $340^{\circ}$  (T) x 5.0' M off. The vessel was making good a course of  $246^{\circ}$  (T) while experiencing a current of 3 knots in a direction  $030^{\circ}$  (T). The vessel experienced the same conditions throughout and steered the same course until Dondra Head was abeam to starboard.

Find the following .

- (i) Position of the vessel at the first observation . ( 05 Marks )
- (ii) The Compass course steered . ( 15 Marks )
- (iii) The speed made good . ( 10 Marks )
- (iv) The time taken to have Dondra Head abeam to starboard . ( 10 Marks )
- (v) The actual position of the vessel when Dondra Head is abeam to starboard . (10 Marks )



**THE PRESIDENTIAL SECRETARIAT  
MERCHANT SHIPPING DIVISION**

**CERTIFICATE OF COMPETENCY EXAMINATION  
GRADE : OFFICER IN CHARGE OF A NAVIGATIONAL  
WATCH ON SHIPS OF LESS THAN 500 GT (NCV)**

**SUBJECT : COASTAL NAVIGATION**

**DATE : 18 TH OCTOBER 1999 , 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 .

---

(1) Find the available depth of water at 0900 hrs. on 18 th October 99 at Colombo Harbour (Sri Lanka) over a charted depth of 10 metres.

(20 Marks)

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

- (i) Submerged wreck not dangerous for surface navigation.
- (ii) Approach channel dredged to a clear depth of 14m.
- (iii) A light float fitted with a Racon and a light flashing three every 10 seconds with a range of 20 Miles.
- (iv) A Traffic Separation Scheme.
- (v) Pilot Boarding Position

(04 Marks each)

(3) At 1200 hrs. your vessel was off port of Colombo (06 56.5N, 079 50.5E) with Galbokka Light Brg. 101 (T) x 3'.0 M. The vessel was experiencing a current of 000(T) x 4 Knots throughout. From the position vessel steered a course of 180(T) until the Baberyn Light was a beam to port. The vessel was making a speed of 14 knots. The vessel has to finally reach a position off Galle Light House Brg. 057 (T) x 5.5 Miles.

Find the following ,

(a) The speed made good from Colombo to Barberyyn. (05 Marks )

(b) ETA at Barberyyn Light House (when a beam). (10 Marks )

(c) True course to make good to reach the destination from Barberyyn. (10 Marks )

(d) True course to steer counteracting the current. (15 Marks )

Contd.....2/..





- (e) Compass course to steer counteracting the current . (10 Marks )  
(f) Speed made good from Barberyn to Galle . (10 Marks )  
(g) ETA at final destination . (10 Marks )
- (4) An observer on board a vessel off the coast at Dondra read a horizontal sextant angle between Dondra Light and Weligama Light to be  $63^\circ$  . At the same time Dondra Light bore  $053^\circ$  (T) . The vessel has to proceed to Hambantota from the present position.
- (a) Find the position of the vessel at the time of the observation . (15 Marks )  
(b) Plan the passage to proceed to Hambantota from the present position. (25 Marks )