

**Candidate's Name:**

**Ports and Shipping Organization  
Examination and Certification Directorate**

**Exams Cycle:**

**Subject: Terrestrial and Coastal Navigation & Nav Aid**

**Date:**

**Rank : Chief Mate (GT $\geq$ 3000)**

**Time allowed: 3.0 Hrs**

*Use deviation card no1, tide table 2000, chart no1121, nories table, and variation As per chart. Positions in the brackets are only for guidance and should not be used as actual position of symbols.*

**Part a : total marks(70 Marks)**

**Q.1)** A ship steering 010° (T) observes "Rock a bill" light (53° 35'N 006° 00.0' W) bearing 310° (T). After running 18 miles same light bore 240°(T) and having done another 12 miles on the same course, same light bears 210°(T). At the time of taking third bearing "calf of man" light house (54° 3.4' N 004° 50' W) (FL 15s 28M) was observed to bear 080°(T).

- a) Find the ship's position at the time of third bearing. (8 Marks)
- b) Find course and distance made good and set and drift of the current. (12 Marks)

**Q.2)** At Noon a vessel steering 210 ° (C) at 16 KTs obtained a meridian altitude of the Sun and found the latitude to be 52° 50' N.

At 1400 hrs "Tuskar rock" light house (52° 12' N 006° 12' W) was observed to bore 230° (C).

Required the position of the vessel at Noon and at 1400 hrs, making due allowance for the effect of the tidal stream estimated to set 320° T at 3 knots.

(20 Marks)

**Q.3)** On 12<sup>th</sup> March 2000 find the earliest time for a vessel at Formby (ATT vol. I) With max. Draft of 9.7 meter, which can pass over a patch with a charted depth of 3.0 meters. Allow 50cm for under keel clearance. (15 Marks)

**Q.4)** Find the great circle distance and the initial course and the position of the vertex between the following positions: (15 Marks)

From: a) 45° 47' S, 170° 45' E

To : b) 12° 04' S, 077° 14' W

**Part b : total marks(30 Marks)**

**Q.1)** a) In a magnetic compass describe the causes of the following errors and how each error could be compensated for:

i) Gaussing      ii) Heeling (10 Marks)

b) State care and maintenance of magnetic compass. (7 Marks)

**Q.2)** a) Describe the function and usage of the following controls on an auto-pilot;

i) Rudder

ii) Yaw

iii) Non-follow up

(2 Marks each)

b) Explain how would you assess if the auto pilot has been set for the optimum performance? (7 Marks)

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**Part a: total marks (70 Marks)**

**Q.1)** A vessel steering 315°C observes "Tuskar Rock" light house (52° 12' N, 006° 12' W), 45° On the Port bow and a radar distance of 10 miles,

a) Find vessel position for the time of observation, (5 Marks)

b) From the position found at (a), find the compass course to steer to pass

"Bardsey Isl "light Fl(5)15s26Mile (52° 45' N 004° 47' W), 7 miles to STBD. Assume current to set 000° (T) at the rate of 4 knots and a Southeasterly gale to cause 5° leeway throughout and vessel's speed to be maintained at 15 knots. (10 Marks)

c) What would be the distance off when "Bardsey Isl "light to be 30° on STBD bow.

(5 Marks)

**Q.2)** A vessel is steering 190° (T) at 16 Knots, observes "Calf of Man" light (54° 03.4' N 004° 49' W) (FL 15s 28 M) bearing 150° (T). After steaming for two hours, same light house bore 040° (T).

a) Find the ship's position at the time of second observation allowing for a current setting 090° (T) at 3 knots and allowing for 10° leeway due to a strong Easterly gale.

(10 Marks)

b) What would be the bearing and distance of the vessel from the light house?

i) At the time of the beam bearing of the light house.

(5 Marks)

ii) At the time of the nearest approach to the light house.

(5 Marks)

**Q.3)** On 27<sup>th</sup> April 2000 find the earliest time for a vessel at Fleetwood (ATT vol. I)

With Draft forward 7.40 meter and aft 7.60 meter, which can pass over a patch with a charted depth of 2.0 meters. Allow 50cm for under keel clearance. (15 Marks)

**Q.4)** The initial course of a great circle track from 40° 35' N, 163° 36' E is 136° (T); calculate the Longitude in which the track crosses the Equator and the course at that point. (15 Marks)

**Part b: total marks (30 Marks)**

**Q.1)** Explain following in a magnetic compass:

a) SOLAS requirement for carriage of magnetic compass.

(5 Marks)

b) Performance standards for magnetic compass.

(5 Marks)

c) Variation of the magnetic compass.

(5 Marks)

**Q.2)** Explain four main components of an auto pilot.

(15 Marks)

**Good Luck**

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**Part a : total marks(70 Marks)**

**Q.1)** A ship steering 010° (T) observes “Rock a bill “light (53° 35'N 006° 00.0' W) bearing 310° (T). After running 18 miles same light bore 240°(T) and having done another 12 miles on the same course, same light bears 210°(T). At the time of taking third bearing “calf of man” light house (54° 3.4' N 004° 50' W) (FL 15s 28M) was observed to bear 080°(T).

- a) Find the ship's position at the time of third bearing. **(8 Marks)**
- b) Find course and distance made good and set and drift of the current. **(12 Marks)**

**Q.2)** At Noon a vessel steering 210 ° (C) at 16 KTs obtained a meridian altitude of the Sun and found the latitude to be 52° 50' N.

At 1400 hrs “Tuskar rock” light house (52° 12' N 006° 12' W) was observed to bore 230° (C).

Required the position of the vessel at Noon and at 1400 hrs, making due allowance for the effect of the tidal stream estimated to set 320° T at 3 KTs.

**(20 Marks)**

**Q.3)** On 16<sup>th</sup> Jan 2000 find the latest time for a vessel at Heysham (ATT vol. I) with forward draft of 8.20 meter and Aft draft of 8.60 meter, which can safely pass over a patch with a charted depth of 3.0 meters. Allow 50cm for under keel clearance.

**(15 Marks)**

**Q.4)** find the distance along a composite great circle from English Channel ( 49° 30' N, 010° 00' E) to Saint Jones Newfoundland(47° 34' S, 052° 40' E ) if limiting Latitude is 50° N.

**(15 Marks)**

**Part b : total marks (30 Marks)**

**Q.1)** Explain following in a magnetic compass:

- a) Importance of keeping a record of observed deviations.
- b) Reason of change in magnetism during life of a vessel.
- c) Reason of operational checks for magnetic compass.

**(5 Marks each)**

**Q.2)** a) Explain, how position fix is achieved by GPS;

**(7 Marks)**

- b) State, what are the system error and accuracy of position fix obtained by GPS system.

**(8 Marks)**

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**Q.1)** A ship steering  $010^{\circ}$  (T) observes "Rock a bill" light ( $53^{\circ} 35'N$   $006^{\circ} 00.0' W$ ) bearing  $310^{\circ}$  (T). After running 18 miles same light bore  $240^{\circ}$ (T) and having done another 12 miles on the same course, same light bears  $210^{\circ}$ (T). At the time of taking third bearing "calf of man" light house ( $54^{\circ} 3.4' N$   $004^{\circ} 50' W$ ) (FL 15s 28M) was observed to bear  $080^{\circ}$ (T).

- c) Find the ship's position at the time of third bearing. (8 Marks)  
d) Find course and distance made good and set and drift of the current. (12 Marks)

**Q.2)** At Noon a vessel steering  $210^{\circ}$  (C) at 16 knots obtained a meridian altitude of the Sun and found the latitude to be  $52^{\circ} 50' N$ .

At 1400 hrs "Tuskar rock" light house ( $52^{\circ} 12' N$   $006^{\circ} 12' W$ ) was observed to bore  $230^{\circ}$  (C).

Required the position of the vessel at Noon and at 1400 hrs, making due allowance for the effect of the tidal stream estimated to set  $320^{\circ}$  T at 3 knots. (20 Marks)

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