

Ports and Shipping Organization
Seafarer's Examination and Certification Directorate
Exams Cycle:

Subject : Electronic Nav. Aids & compasses
Rank : Chief Mate (GT>3000)

Date :
Time Allowed : 2.5 Hours

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

- i) Gaussing (12Marks)
ii) Heeling (8Marks)
b) State care and maintenance of magnetic compass

Q.2) a) With the aid of block diagram explain the basic operation of auto pilot system (14Marks)

- b) Describe the following terms.
i) Follow up (6Marks)
ii) Non-follow up

Q.3) Give a description of the following as applied to a gyro compass:

- a) Damping in tilt, (10Marks)
b) Damping in azimuth. (10Marks)

Q.4) With reference to Global Positioning Satellite System:

- a) Describe the principles and signal processing employed in the system to establish a three dimensional fix position. (14Marks)
b) State the sources of errors which affecting the position fix. (6Marks)

Q.5) The following observations were made of the sun when swinging the ship slowly to adjust a well placed standard compass at a position where the variation was 10 degree west.

COMPASS HEADING	000	045	090	135	180	225	270	315
COMPASS BEARING	139	135	135	141	140	141	145	146
TRUE BEARING	124	125	123	124	123	125	127	129

a) Obtain a list of deviations (4Marks)

b) Analyze these in to various coefficients (8Marks)

c) Explain how to compensate for coefficient "B" (8Marks)

Candidate's Name:

**Ports and Shipping Organization
Examination and Certification Directorate
Exams Cycle:**

Subject: Nav Aid
Rank : Chief Mate (GT_≥3000)

Date:
Time allowed: 2.5 Hrs

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 (12 Marks)

b) State care and maintenance of magnetic compass. (8 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

iv) Rudder limit (3 Marks each)

b) Explain how you would assess if the auto pilot has been set for the optimum performance? (8 Marks)

Q.3) With reference to the Global Positioning Satellite System;

a) Describe the principles and signal processing, employed in the system to establish a three dimensional position. (14 Marks)

b) Describe the sources of errors affecting the position. (6 Marks)

Q.4) Give a description of the followings as applied to a gyro compass:

a) Damping in tilt, (20 Marks)

Q.5) The following observations were made of the sun when swinging the ship slowly to adjust a well placed standard compass at a position where the variation was 10 degree west.

compass heading	000°	045°	090°	135°	180°	225°	270°	315°
compass bearing	157°	141.5°	136.5°	142°	153°	167.5°	180.5°	181°
True bearing	142°	144°	145°	146°	147°	148°	149°	150°

a) Obtain a list of deviation; (4 Marks)

b) Analyze these in to various coefficients; (8 Marks)

c) How would you attempt to locate the cause and remove the effect of coefficient 'a'? (8 Marks)

Candidate's Name:

***Ports and Maritime Organization
Examination and Certification Directorate
Exams Cycle:***

Subject: Nav Aid
Rank : Chief Mate (GT \geq 3000)

Date:
Time allowed: 2.5 Hrs

Q.1) Explain following in a magnetic compass:

- a) SOLAS requirement for carriage of magnetic compass. (7 Marks)
- b) Performance standards for magnetic compass. (7 Marks)
- c) Variation of the magnetic compass. (6 Marks)

Q.2) Explain four main components of an auto pilot. (20 Marks)

Q.3) Describe the principles of DGPS and discuss its level of accuracy in comparison with GPS. (20 Marks)

Q.4) With the help of sketches describe the properties of free gyro. (20 Marks)

Q.5) The following observations were made of the sun when swinging the ship slowly to adjust a well placed standard compass at a position where the variation was 10 degree west.

compass heading	000°	045°	090°	135°	180°	225°	270°	315°
compass bearing	136°	115°	125°	146°	151°	161°	170°	174°
true bearing	125°	118°	137°	141°	148°	172°	176°	162°

- a) Obtain a list of deviation; (4 Marks)
- b) Analyze these in to various coefficients; (8 Marks)
- c) How would you attempt to locate the cause and remove the effect of coefficient 'c'? (8 Marks)

Good luck