DIRECTORATE OF MERCHANT SHIPPING
GOVERNMENT OF SRI LANKA
CERTIFICATE OF COMPETENCY EXAMINATION

GRADE : CHIEF MATE ON SHIPS OF 500 GT OR MORE (UNLIMITED)
SUBJECT : Electronic navigation systems
DATE : 06th July 2017

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. Electronic devices capable of storing and retrieving are **NOT** allowed.

(1) (a) What are main segments in the GPS system

(10 Marks)

(b) Describe the importance of Clock Synchronization in GPS system.

(15 Marks)

(2) Explain the following in relation to LRIT
(a) Ship equipment
(b) Communication service provider
(c) Application service provider
(d) Datacenters
(e) International data Exchange

(05 Marks each)

(3) (a) Describe main parts of the Automatic Identification System

(20 Marks)

(b) Explain modernization and satellite applications of AIS

(05 Marks)

(4) a) Explain any top-heavy method of a gravity control gyroscope by using suitable sketches.

(10 marks)

b) Describe how to determine the direction of precession on the above gyroscope.

(05 marks)

c) Draw the path taken by the north end of a controlled gyro situated in NH or SH, indicating relevant vectors.

(10 marks)

(5) a) List ten IMO requirements on the performance standard of a Gyro Compass

(10 marks)

b) Name errors of the Gyro compass and describe any two of them indicating how to minimize them.

(10 marks)

c) Explain why controlled gyro should be damped to use it as a Gyro compass

(05 marks)

6) You are on board a vessel at Istanbul where H was recorded to be 13 A/m and Z = 15 A/m whilst the value of Coefficient C was (+) 7^0 and that due to Induced C was (-)2^0.

a) Determine the total deviation due to Coefficient C on a heading of 050^0 off Cape Town where H = 18 A/m and Z = (-)20 A/m.

(10 marks)

b) With the aid of sketches:

i. define any 2 (two) of following coefficients showing their deviation indicators and show how you would affect corrections to any one of them which you defined.

A, B, C, D, E, J.

(05 marks)

ii. Write short notes on any 3 (three) from following:
Kelvin deflector,
vertical force instrument,
gauzing error,
retentive error.

(06 marks)

c) With aid of necessary sketch explain any **one** of the following:

i. Construction of a compass bowl.
ii. H/E correcting system.
iii. Explain briefly what a TMC is along with a sketch indicating its main components.
iv. List down the methods of compass adjustments.

(04 marks)