



**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 : 29th November 2018

Time allowed **THREE** hours

Total marks : 120

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) Describe the internal operational system of the onboard GPS receiver in displaying position. (15 marks)
- 2) What are the main categories of errors encountered with the eLoran and describe the pulse format used by Eurofix and 9th Pulse methodologies with reference to the “Data Channel” (15 marks)
- 3) Describe the existing technology utilization of the LRIT network. (15 marks)
- 4) Explain the AIS system components structure and describe the present applications of “distribution data” for potential users. (15 marks)
- 5)
 - a) Explain the three-degree freedom of free gyroscope. (05 marks)
 - b) Calculate the drifting and tilting of a free gyroscope in latitude 40°00’N with an azimuth of 060°. (04 marks)
 - c) Draw the path traced out by the North end of a controlled gyro placed in a Southern latitude. (06 marks)
- 6)
 - a) With the aid of suitable sketches show that a gyro damped in tilt always has an error (latitude) in alignment with the meridian except on the equator. (08 marks)
 - b) Describe how the compass manufactures compensate for above error. (07 marks)

7)

- a) Analyze the following deviations and determine the values of the approximate coefficients:

N	NE	E	SE	S	SW	W	NW
6° W	4° W	5° E	11° E	6° E	2° W	5° W	5° W

(10 marks)

- b) Explain with the aid of suitable sketches also referring to a suitable coefficient', the various pros & cons between continuous and broken HSI

(07 marks)

- c) List down the order of placing the correctors and explain its significance on placing the SI correctors before the HI correctors.

(07 marks)

- d) Write brief notes on any 3 of the following terms:

- a) Lambda and Mu
- b) TMC
- c) VFI
- d) KD
- e) Mag compass requirement aboard ship

(06 marks)