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 : 04th March 2021   Time : 0900 to 1200 hrs

Time allowed **THREE** hours	Total marks : 180
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) Describe the annual survey requirements of AIS as stipulated by IMO
    b) Explain present developments of AIS long range applications

(15 marks each)

2) Describe the following with respect to the ELORAN system:
    a) Pulse Format
    b) Phase Coding
    c) Blink
    d) Secondary Coding Delay
    e) Group Repetition Interval
    f) Envelope and Cycle matching

(05 marks each)

3)
    a) List the organizations that are eligible to obtain LRIT information.

(04 marks)

    b) Describe importance of Data Distribution Plan in LRIT.

(06 marks)

    c) What is SOTDMA with reference to AIS?

(10 marks)

    d) Describe the identification of AIS SART and how to distinguish "Test" and "Activation".

(10 marks)

4) Describe the errors encountered in GPS system.

(30 marks)

5)
a) i. Define Coefficient "J
ii. Explain in a simple sketch the H/E correcting system

(05 marks each)

b) A vessel is found to possess a H/E (heeling error) of 5^0 E on a heading 030^0 C when heeled 6^0 to Starboard.
What would be her H/E on a heading of 300^0 C when heeled 4^0 Port?

(10 marks)

c) Define all following coefficients and explain with the aid of a sketch how any one out of any are minimized or eliminated.
A, B, C, D and E

(10 arks)

6) Fibre optic Gyro compasses are used in modern day navigation replacing conventional mechanical Gyro compass.

a) Explain fully how fibre optic gyro compasses woks to determine north.

(15 marks)

b) Sketch and label a block diagram of a fibre optic gyro compass.

(15 marks)