



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

GRADE : CHIEF MATE ON SHIPS OF 500 GT OR MORE (UNLIMITED)
SUBJECT : Meteorology
DATE : 09-Jun-2020

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) In accordance with the earth's atmosphere answer the following;
 - a) According to the climatic patterns of the earth there are three major climate zones. Explain with suitable diagrams these climatic zones of the earth. (15 marks)
 - b) There are wide variations in temperatures at different heights of the earth's atmosphere. Explain in detail the general pattern of vertical temperature variation in the earth's atmosphere. (15 marks)
- 2) Surface wind is one of the main considerations in voyage planning, with reference to wind answer following.
 - a) Generally, wind will blow across the isobars and deflected by coriolis force. But in some situations, wind blow parallel to isobars. Explain with suitable sketches the types of wind which blow parallel to isobars. (15 marks)
 - b) The general circulation of earth's atmosphere is modified due to large land masses and surface wind pattern may alter due to various factors. With regards to surface wind explain what is meant by periodical wind and local wind including examples for both categories. (15 marks)
- 3) Knowledge of the ocean currents helps mariner to take early and effective measures in many operational issues. With regards to ocean currents answer following questions:
 - a) Explain in detail Drift currents and Gradient currents. (15 marks)
 - b) Briefly describe warm and cold currents and mark with suitable colors on the **MAP PROVIDED**. (15 marks)

- 4) In mid-latitude navigation, mariners should have substantial knowledge of weather associated in mid- latitudes. Frontal and frontal depressions greatly vary by its characteristics compared to tropical cyclones. Answer the following questions in relating to fronts and frontal depressions:
- a) Briefly explain properties of air masses and factors effecting properties of an air mass. (15 marks)
 - b) Briefly explain Cold front, Warm front and weather associated with each condition with suitable sketches including symbols used in weather map for each condition. (15 marks)
- 5) In merchant shipping, there are many casualties reported due to sea ice and icebergs. Knowledge and information relating to sea ice and icebergs may help mariner to avert such situations effectively. With regards to sea ice and icebergs answer the following questions:
- a) There are two primary reasons for movement of sea ice and icebergs. Briefly explain these two primary reasons of movement of sea ice and icebergs. (10 marks)
 - b) Information relation to sea ice and ice bergs will help mariner to take precautions in advance. Enumerate the sources of information available to mariner with regards to sea ice and icebergs. (10 marks)
 - c) Early identification of ice and icebergs during navigation in effected area is primary concerns of mariners. Briefly explain signs of ice in the vicinity sea ice and icebergs. (10 marks)
- 6) a) Define Following tracks in voyage planning:
- i. Least time
 - ii. Least time with least damage
 - iii. Constant Speed
- (05 marks each)
- b) Write shorts notes on the following:
- i. Significant Wave Height
 - ii. Probable wave height
 - iii. Vector mean current
- (05 marks each)