

**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 : 05<sup>th</sup> July 2017

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Time allowed **THREE** hours

Total marks : 180

**ANSWER ALL QUESTIONS**

Pass marks : 50%

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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.

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1)

- a) Temperature variation of the earth's atmosphere is having a general pattern. Explain in detail with suitable diagrams diurnal variation of atmospheric temperature (15 Marks)
- b) According to the climatic patterns of the earth, three major climate zones can be defined. Explain with suitable diagrams what these three climatic zones are and reason for these climatic zones. (15 Marks)

2)

- a) The common tendency of troposphere is temperature decreases as the height increases. But at times it is noticeable temperature inversion and isothermal layers in the troposphere. Explain with suitable diagrams temperature inversion and isothermal layer including main influences causing these phenomenon's. (18 Marks)
- b) Movement of atmospheric air in the troposphere can be categorized as horizontal and vertical atmospheric air movement. Each of these air movements may be influenced by different conditions of the atmosphere. Explain in detail each main cause for vertical movement of atmospheric air. (12 Marks)

3) Knowledge of ocean currents helps mariner to take early and effective measures in many operational issues. With regard to ocean currents answer following questions.

- a) Briefly describe Drift currents and Gradient currents. (10 Marks)
- b) Briefly describe warm and cold currents and mark with suitable colors on the given world map areas which such currents may experience. (20 Marks)

- 4) With regard to frontals and frontal depressions answer following questions:
- a) Movement of air mass in middle latitudes will result formation of frontals and frontal depressions. Briefly define and describe what is an air mass and factors effecting properties of an air mass.  
(15 Marks)
  - b) Convergence of two air masses does not always means formation of frontals or frontal depressions. Explain in detail with suitable sketches why there are no frontal or frontal depressions occurring at equatorial reigns.  
(15 Marks)
- 5) World is divided in to three climatic zones and each zone is having its inherent type of weather. In relation to tropical zone cyclonic patterns answer following questions.
- a) General tendency of the tropical cyclones is to re-curve at some stage of the movement of the cyclone. Briefly explain why TRS generally re-curve.  
(07 Marks)
  - b) Weather information of cyclones are important tools for mariners to take early and substantial actions in avoiding tropical cyclone. Briefly explain the environmental conditions that support formation of tropical cyclones.  
(08 Marks)
  - c) Affective avoiding actions of tropical cyclones may depend on various factors. Briefly explain general avoiding actions for N/H and S/H for following conditions.
    - i. If vessel lies in dangerous quadrant,
    - ii. If vessel lies in the path of the TRS
    - iii. If vessel lies in the Navigable semi circle .(15 Marks)
- 6) 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 regard to sea ice and icebergs answer following questions.
- a) There are two primary reasons for movement of sea ice and icebergs. Briefly explain these two primary reasons of the 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 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)