**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 : 28- Dec-2023 Time: 0900 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. Mariner’s knowledge relating to ocean currents will help in many aspects when transiting different areas in different seasons. In relation to ocean currents briefly explain the following questions with examples.
   1. Drift Current
   2. Gradient Current
   3. Upwelling current
   4. Warm current
   5. Cold Current
   6. Seasonal Current

(05 marks each)

* 1. Over the earth surface it is noticeable different areas of the world are having different climatic conditions. Explain with suitable sketches why surface temperature varies over the earth surface.

(15 marks)

* 1. Much of weather related conditions could be explained by evaluating atmospheric stability conditions at the local geographical area. In relation to atmospheric stability briefly explain Stable, Unstable and Conditional atmospheric stability with suitable sketches.

(15 marks)

* 1. Radiation fog sometimes referred as land fog since it mainly forms over land. Explain in detail formation of radiation fog including conditions favorable for the same.

(15 marks)

* 1. There are noticeable warm and dryness on the leeward side of the mountain range compared to the windward side of the mountain. Explain why leeward side of a mountain range is warm and dry compared to windward side of the mountain.

(15 marks)

* 1. 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)

* 1. Generally surface winds generate due to changes in isobars over the surface. But there are few surface winds which do not have direct relation to Isobars. Explain in detail these surface winds which do not have direct relation to isobars.

(15 marks)

* 1. 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 diagram temperature inversion and isothermal layer including main influencing causes for these phenomena.

(15 marks)

* 1. In order to describe certain meteorological pheromones state of stableness of atmosphere is very vital. Define what atmospheric stability is and explain with suitable diagrams main four states of atmospheric stability.

(15 marks)

1. Weather routing being used in merchant ships to obtain least time track and optimum route. With regards to weather routing answer the following questions:
   1. What are the main factors to be considered in order to obtain optimum weather routing for a particular vessel during transit of a particular area?

(15 marks)

* 1. What are the main weather charts vessels should consider when weather routing and with the aid of the attached weather maps and below ship particulars explain how to obtain suitable route according to the given weather maps?

Type of vessel : General cargo vessel

Actual displacement :34000 t

GM : 0.95 m

Mean draft : 7.56 m

Propeller immersion : 78%

Cargo onboard : General cargo on deck and under deck

Vessel’s departure port is Vancouver BC and the port of arrival is Yokohama.

(15 marks)



