



**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 : 3rd 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) Define following with suitable sketches where applicable

- a) Coriolis force
- b) Pressure Gradient force
- c) Katabatic Wind
- d) Cumulonimbus Cloud
- e) Line-squall

(06 marks each)

2)

- a) 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)

- b) 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)

- 3) A frontal depression is a low-pressure area formed at the boundary between two different air masses. It occurs in middle or higher latitudes. Series of the following one after the other is known as 'family of frontal depressions'. 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) 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)
- 4) Sea ice is frozen seawater that floats on the ocean surface. It forms in both the Arctic and the Antarctic in each hemisphere's winter; it retreats in the summer, but does not completely disappear. With regard to sea ice and iceberg 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 iceberg during navigation in effected area is primary concerns of mariners. Briefly explain signs of ice in the vicinity sea ice and icebergs.
(10 marks)
- 5) Tropical cyclone, also called typhoon or hurricane, an intense circular storm that originates over warm tropical oceans and is characterized by low atmospheric pressure, high winds, and heavy rain. With respect to Tropical cyclones answer following questions.
- a) List the favorable conditions of formation of tropical cyclones.
(07 marks)
- b) Briefly explain indication of approaching of tropical cyclone including method of ascertaining vessel's position with regard to the position of TRS.
(08 marks)
- c) Explain in detail with suitable sketches general avoiding actions in Northern hemisphere if the vessel is in Navigable semicircle and Dangerous semicircle respectively.
(15 marks)

6) Weather routing is done by collection of oceanographical and meteorological data, and data received from weather satellites and good forecasting techniques.

a) Lists the benefits of shore based weather routine for ships.

(08 marks)

b) Briefly explain following tracks with examples:

i. Least time

ii. Least time and least damage

iii. Least damage

(04 marks each)

c) With a suitable sketch explain how a least time track is constructed.

(10 marks)