



MERCHANT SHIPPING SECRETARIAT
GOVERNMENT OF SRI LANKA
CERTIFICATE OF COMPETENCY EXAMINATION

GRADE : CHIEF MATE ON SHIPS OF 500 GT OR MORE (UNLIMITED)
SUBJECT : Ship Construction
DATE : 25.04.2023

Time allowed **THREE** hours

Total marks : 120

ANSWER ANY SIX 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) Discuss the areas of corrosion and reasons leading to it, in cargo spaces of following types of ships:
- i. Crude oil carrier (05 marks)
 - ii. Bulk carrier (05marks)
 - iii. General cargo ship (04marks)
- b) What are preventive methods used in crude oil tankers to reduce corrosion? (03marks)
- c) What are the effects, if this corrosion is allowed to continue unchecked in tankers? (03marks)

2)

- a) Explain the following in relation to sliding watertight doors positioned below the water line which are used while at sea:
- i. Methods available for closing and opening.
 - ii. What are the occasions that these doors will be opened & close? (04 marks each)
- b) As a chief officer, explain to a new crew member how to pass safely through a hydraulically operated watertight door. (12 marks)

- 3)
- a) With a aid of a sketch describe how a free standing prismatic (independent) tanks for the carriage of liquid gasses are located and supported. (12 marks)
 - b) What are the advantages offered by similar construction to affect the following?
 - i. safety
 - ii. cargo containment
 - iii. stability
 - iv. effective maintenance of strength members of hull (06 marks)
 - c) what materials are used in construction of inner most linings of such tanks and the important property considered in selecting such material. (02 marks)
- 4) Structural degradation of a ship's hull generally increases in proportion to the ships age and damage to the structure can occur at any time in the life of the ship.
- a) In relation to above indicate 04 reasons for structural degradation and damage of ship structure. (06 marks)
 - b) As a result of above, how can they lead to failure of material? (07 marks)
 - c) Discuss the areas most susceptible for degradation and corrosion in a general cargo ship. (07 marks)
- 5)
- a) With reference to the activated fin stabilizers;
 - i. Make a simplified sketch of the essential features and explain how the rolling reduction is achieved. (04 marks)
 - ii. Explain how it operates. (04 marks)
 - iii. What are the reasons for using passing tanks are used on larger ships? (03 marks)
 - b) Sketch & describe Bilge keel and the answer should include the;
 - i. construction
 - ii. purpose
 - iii. position
 - iv. method of attachment and
 - v. how to attend repairs in the event of damage (09 marks)

- 6)
- a) Sketch 4 types of weld joints and explain the application of such weld joints in relation to ship construction. (12 marks)
 - b) What is Welding Procedure Specification, or qualified welding procedure? (08 marks)
- 7)
- a) Sketch a vent suitable for a double bottom fuel tank and name the components. (05marks)
 - b) With reference to double bottom fuel tanks:
 - i. state why weighted cocks are fitted to the tank sounding pipes;
 - ii. state the purpose of air pipes; (03 marks each)
 - c) State the design features incorporated on air pipe vents with respect to EACH of the following:
 - i. Heavy weather
 - ii. Fire
 - iii. Bunkering (03 marks each)
- 8)
- a) Explain the routine steps for surface preparation and painting of hull under water area of an existing ship in dry dock. Your answer should include the reason for each activity. (10 marks)
 - b) What are the regulatory requirements to be satisfied in under water coatings (03 marks)
 - c) What are the parties involved and how they help in achieving the expected PERFORMANCE STANDARDS FOR PROTECTIVE COATINGS (PSPC) for dedicated ballast tanks? (07 marks)

9)

a) With the aid of a sketch explain the strengthening method of a transverse cargo hold bulk head in a crude oil carrier.

(06 marks)

b) List five terms that describe the conditions that is related to hull distortion.

(05 marks)

c) State the **advantages** and **disadvantages** of using following materials in ship construction

i. Steel

ii. Aluminum

iii. FRP (fiber reinforced plastics)

(03 marks each)