



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

GRADE : CHIEF MATE ON SHIPS OF 500 GT OR MORE (UNLIMITED)
SUBJECT : Ship Construction
DATE : 07.08.2019

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) Name 05 methods used in improving the propeller efficiency of a ship. (05 marks)
b) Describe 03 of the improvements named in (a) above (05 marks each)
- 2) a) Differentiate water tightness and weather tightness (06 marks)
b) Sketch and describe the method of achieving water tightness of a hatch cover at:
 - I) the periphery (outer edges) (07 marks)
 - II) the cross joint (07 marks)Your answer should indicate the method of achieving correct packing compression.
- 3) a) Sketch the forward construction of a ship (08 marks)
b) In relation to the collision bulkhead comment on following:
 - I) position of the bulkhead relative to the length of the ship
 - II) extent of the collision bulk head
 - III) openings through the collision bulkhead
 - IV) compartments that forward of the bulkhead that may get filled in the event of a damage (03 marks each)

- 4) a) Explain following in relation to sliding watertight doors positioned below the water line which are used while at sea:
- I) methods and position of closing and opening (04 marks)
 - II) when do you open and close such doors (04 marks)
 - III) how do you ensure that the strength at the opening is sufficient to withstand the water pressure of the bulkhead (04 marks)
- b) If a watertight door is closed from the remote control station, explain the sequence of events that can take place when you try to open the door locally. (08 marks)
- 5) a) With a aid of a sketch describe how a free standing prismatic (independent) tanks for the carriage of liquefied gasses are located and supported. (10 marks)
- b) With regard to above what are the advantages offered by similar construction to effect?
- I) safety
 - II) cargo containment
 - III) stability
 - IV) effective maintenance of strength members of hull
- (02 marks each)
- c) What materials are used in construction of inner most linings of such tanks and indicate the important property considered in selecting such material. (02 marks)
- 6) a) Sketch FOUR types of rolled steel sections commonly employed to stiffen plating. (04 marks)
- b) State where in ship's structure the rolled sections in (a) would be employed (03 marks)
- c) Discuss the advantages of using high strength steel as a ship construction material in relation to their properties (07 marks)
- d) Indicate:
- I) the main attractions of Aluminium in preference to mild in ship construction (03 marks)
 - II) the disadvantages of use of Aluminium (03 marks)

- 7) a) A Frame is a stiffener member attached to the inside of the hull of the ship. Explain the service rendered by that (05 marks)
- b) What are the types of framing systems used in construction of vessels and discuss the important features related to such framing systems (15 marks)
- 8) a) State the PURPOSE of each of the following and describe where they are located in the ship structure:
- I) Vent pipe (03 marks)
 - II) sheer (03 marks)
 - III) Hawse Pipe (03 marks)
 - IV) Bitter end (03 marks)
 - V) Spurling Pipe (03 marks)
- b) Elaborate function of bilge keel with a sketch (05 marks)
- 9) a) Explain the usual routine steps for surface preparation and painting of hull under water area and topside of a existing ship in dry dock. (Your answer should include the reason for each activity) (14 marks)
- b) What are advantages of foul release coatings as protective coating for under water areas of a ship and their limitation in application. (06 marks)