



**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 : 30th January 2018

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) “Bulbous bow (bulb) used as an important part of the hull”. Discuss the reasons in support of this statement. (05 marks)
 - b) Explain the reasons that in modern ship construction sometimes, the bulbous bow is completely eliminated or existing ones are being modified. (05 marks)
 - c) State the type of steel that are currently used for the hull of a modern vessel and reasons for their selection. (05 marks)
 - d) Describe the tests that are carried out on steel plates to ascertain the welding joint strength of a hull plate. (05 marks)

- 2)
 - a) List 05 methods used in improving the propeller efficiency of a ship. (04 marks)
 - b) Describe any 04 of the improvements given in (a) above. (04 marks each)

- 3)
 - a) State the factors in the storage of welding rods which will assist in producing a good quality weld. (02 marks)
 - b) A steel material of;
 - i) 5 mm and
 - ii) 30 mm

joints are to be butt welded by manual metal arc welding. Sketch a suitable form of edge preparation to be used in each situation.

(05 marks each)

- c) Suggest methods of inspection for the above welding joints to ascertain the quality of the welding joints.
(03 marks)
- d) Explain a test that can be carried out by ship staff to check the quality of the weld
(05 marks)
- 4) Suggest, with reasons, why EACH of the following courses of actions are appropriate, if a ship begins to roll in heavy seas:
- frequently sound all hold bilges;
(04 marks)
 - frequently sound bilges in chain locker, peak tanks, cofferdams and other void spaces;
(06 marks)
 - sound all fuel, fresh water and ballast tanks;
(04marks)
 - if satisfied with (a), (b) and (c) trim ship by the stern and correct any list;
(03marks)
 - reduce speed of main engine.
(03marks)
- 5)
- With a aid of a sketch describe how a free standing prismatic (independent) tank for the carriage of liquefied gasses are located and supported in ship structure.
(12 marks)
 - What are the advantages offered by similar construction to effect;
 - safety
 - cargo containment
 - stability
 - effective maintenance of strength members of hull
(05 marks)
 - What materials are used in construction of inner most linings of such tanks?
(01 mark)
 - Indicate the important property considered in selecting such materials.
(02 marks)

- 6)
- a) In relation to ship construction and survey explain the purpose of;
 - i) Plan approval and
 - ii) Type approval

(04 marks each)
 - b)
 - i) Explain the relevance of carrying out a sea trial before being commissioned.

(02 marks)
 - ii) Make a list and briefly discuss the typical trials and measurements conducted during the sea trials of a motor ship.

(10 marks)
- 7) Explain the goals that are expected to achieve by coating the ship's hull in relation to corrosion prevention, regulations, fuel economy, and extended period between dry docking. Your answer may indicate how each of above is achieved while coating the ship.

(20 marks)
- 8) With reference to dry docking of a vessel;
- a) How the vessel is planned and prepared for dry docking?

(05 marks)
 - b) State the pre docking information and drawings given to dry dock authority.

(05 marks)
 - c) Describe the Extent of survey/items to be examined and repairs carried out in dry dock taking the advantage of dry dock occupation.

(10 marks)
- 9) Structural degradation of the 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.

(05 marks)
 - b) As a result of above, how can they lead to failure of material?

(05 marks)
 - c) Discuss the areas most susceptible for degradation and corrosion in a general cargo ship.

(10 marks)