



libsony

**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 BOARD OPERATIONS
DATE : 25.08.2023

Time allowed THREE hours
ANSWER ALL QUESTIONS

Total marks : 180
Pass marks : 60%

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) Monitoring of reefer compartment and refrigeration machinery for correct functionality there are several sensors and transducers are fitted to the refrigeration system. List and explain the basic sensors and transducers fitted to the refrigeration system of the vessel including importance of each item listed. (15marks)
- b) During the carriage of cargo, preservation of cargo achieved by various means. Temperature control is one of the main methods used to preserve certain cargoes. Explain with suitable examples main reasons for temperature control. (15 marks)
- 2)
- a) Inclination of a vessel may occur due to various factors such as external and internal. Explain in detail with suitable sketches how a vessel will incline due to these internal and external factors. (10 Marks)
- b) Loading instrument either analog or digital helps ships officers to assess the vessels stability at any given situation. List main inputs and outputs of stability instrument. (10 Marks)
- c) Stability booklet provided to the vessel is the main guidance to the ships officers in judging vessels stability. List main contents of the stability booklet. (10marks)
- 3) There are various measures are in place to monitor merchant vessels condition, Dry docking and regular survey arrangement are one of the key measures in monitoring merchant vessels condition.
- a) List and indicate survey pattern for all the certificate categorized under Harmonized System of Survey and Certification (HSSC). (10 Marks)
- b) Briefly explain Marpol Annex 1 Survey items. (10 Marks)

- c) In relation to Dry docking repair list briefly describe Standard maintenance items, Repair items and Modification items.

(10 marks)

- 4) With reference to tanker operations;

- a) Explain how cavitation and gassing up can occur?
b) Explain in detail inert gas system on board a Tanker.
c) Give reasons for choosing such a gas for use and how the risks associated are eliminated / minimized?

(10 marks each)

- 5)

- a) Merchant ships are protected from environmental deterioration by various means. Painting of vessels are not only enhance the cosmetic appearance of the vessels it also to protect the vessels from various processes. Explain in detail main protections offered by marine paints.

(15 Marks)

- b) A vessel having flat bottom area of 6120m^2 required to be painted with two coats of primer and one coat of antifouling paint. Calculate the total requirement of paint and thinner if each primer coating requires 100 Microns of DFT and antifouling paint with 175 Microns of DFT.

Specification of paint as follows.

	AF Paint	Primer
VS	52%	45%
Thinning	5%	10%

(15 Marks)

- 6) Few years ago, some grain vessels were lost at sea and inquiries indicated it was due to dangerous list associated with bulk grain shift. Subsequently, Grain code was introduced and made it mandatory to follow its provisions.

If you are chief officer;

- a) state the minimum criterion to comply for a vessel to set out to sea with a consignment of grain.

(10 marks)

- b) how the heeling arm due to grain shift is derived and what are the parameters for the vessel to remain seaworthy?

(10 marks)

- c) what action you could take to improve the situation if the vessel is found not complying with the requirements?

(10 marks)