



UNIVERSITY OF RUHUNA

Faculty of Engineering

End-Semester 4 Examination in Engineering: September 2023

Module Number: MN4306

Module Name: Ship Design and Construction
Technology - I

[Three Hours]

[Answer FIVE questions, Maximum marks: 100, Pass mark: 50].

Instructions to Candidates:

1. Answer any FIVE questions.
2. This question paper has SIX questions on four pages.
3. Maximum marks allocated for each section of questions are shown.
4. Drawings and sketches should be clear, neat and in approximate proportion.
5. Use marine colour code for sketches and plans. Red colour is allowed only for sketches.
6. Start your answers to each question on a fresh page.
7. All questions carry equal marks.
8. Clear labelled sketches will be given credits.

Data and Information: Nil

- Q1 a) Describe the circumstances which cause panting and pounding stresses. [04 marks]
- b) With the aid of a sketch, describe a typical arrangement to resist panting at the fore-end of a vessel. [08 marks]
- c) Describe the arrangements to resist pounding. [04 marks]
- d) With the aid of sketches, explain what is meant by the terms "hogging" and "sagging". [04 marks]
- Q2 a) With reference to aft peak tank describe the members which are normally found in aft peak Tank construction. [06 marks]
- b) State type of welding and distinguish the difference between MIG and TIG welding. [04 marks]
- c) With suitable circuit diagrams explain the operation of a hydraulically operated watertight door. [06 marks]
- d) Why water tight bulk heads are required in a ship construction? [04 marks]
- Q3 a) Explain wet type underwater welding system used in ship repairing process with an appropriate circuit diagram. State with reasons the type of polarity of current being used for electrode holder. [08 marks]
- b) Sketch a watertight door and frame showing the manner of attachment to the bulkhead and the additional reinforcement carried by the bulkhead to compensate for the aperture. [06 marks]
- c) Explain the operation of a hydraulic controlled watertight door giving suitable circuit diagrams for remote operation of it. [06 marks]

- Q4 a) Sketch and describe the different floors used in the construction of a double bottom showing brackets, stiffeners, scallops, cutouts, floors, lightening. holes, struts, bracket floors, solid floors, etc indicating where each type is employed.
[07 marks]
- b) Illustrate the difference between watertight and non-watertight cutouts with sketches.
[07 marks]
- c) State and draw type of weld symbols illustrating butt, fillet and corner joints used in ship construction process.
[06 marks]
- Q5 a) State the type of bulkheads used during construction and respective locations in a vessel.
[04 marks]
- b) Explain the stresses that a ship is subject to at the forward end of a large cargo vessel and show with the aid of a sketch the structural members that form the construction of the vessel to withstand these stresses.
[08 marks]
- c) State and draw type of weld symbols illustrating butt, fillet and corner joints used in ship construction process.
[04 marks]
- d) Defects may occur during welding which affect the quality and hardness of plates. State type of destructive testing carried out in ship building.
[04 marks]
- Q6 Location markings are numbers and letters on bulkheads, doors, hatches and Various fittings to indicate their position in the ship.
- a) A ship consists of two decks on super structure and Six decks on hull. Hull is sectioned by Four main transverse bulkheads.
Mark followings on above sketch;
- (i) Decks and sections
- (ii) Longitudinal sub divisions 2AA, 2AZ,, 2DA, 2DB, 2DC, 2DY, 2DZ, 3CA, 3CB, 3CZ

- (iii) the compartment 5C more than one deck high Doors 2C/D, 4CZ, 5CA,
- (iv) the compartment 1B extending beyond a main section aft.

[10 marks]

b) With reference to Deck Plan on second deck mark followings

- (i) transverse subdivisions 2A, 2B1, 2B2, 2C0, 2C1, 2C2, 2C3, 2C4,
- (ii) contained compartments in 2B1, 2B2 and 2D0
- (iii) Doors 2A/B port and 2A/B/ Stbd
- (iv) hatches 2D port, 2D stbd, 2C2, 2B2, 2B1and 2AA

[10 marks]