



# UNIVERSITY OF RUHUNA

## Faculty of Engineering

End-Semester 7 Examination in Engineering: May 2022

**Module Number: ME7212      Module Name: Naval Architecture and Hull Design**

**[Three Hours]**

**[Answer all questions, each question carries ten marks]**

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- Q1 a) Briefly explain the following in relation to six (6) degrees of freedom of ships' movements caused by external forces
- i) Three (3) Transitional Degrees
  - ii) Three (3) Rotational Degrees
- [6 Marks]
- b) Discuss the following in brief
- i) Bilge Keel
  - ii) Fin Stabilizers
- [4 Marks]
- Q2 a) Explain Free surface Effect and counter measures with neat sketches where necessary.
- [5 Marks]
- b) Explain the following with neat sketches where necessary.
- i) Tones per centimeter immersion (TPC)
  - ii) Water Plane Area Coefficient (CW)
  - iii) Mid Ship Area Coefficient (CM)
  - iv) Block Coefficient (CB)
  - v) Moment to change trim by 1 centimeter (MCT1)
- [5 Marks]
- Q3 a) Explain the difference between buoyancy and weight elements of a submarine with examples
- [5 Marks]
- b) Explain the following with sketches as appropriate
- i) Pressure Hull
  - ii) Ballast Tanks

- iii) Diving Planes
- iv) Freely flooded zone

[5 Marks]

Q4 a) Discuss the following Reinforcing Materials used in GRP constructions

- i) E glass fiber
- ii) S or R glass
- iii) Carbon
- iv) Aramid (Kevlar) fibers

[5 Marks]

b) Differentiate between Ordinary strength and High Strength steels used in Ship Construction

[3 Marks]

c) Differentiate between ladle analysis and product analysis

[2 Marks]

Q5 a) Discuss briefly on Inclining experiment, including following:

- The purpose of the inclining experiment
- When to carry out
- The sequence of events of the experiment

[5 Marks]

b) Discuss the conditions to meet when carrying out an including experiment.

[3 Marks]

c) Explain the ROV and uses in modern days marine industry

[2 Marks]