



UNIVERSITY OF RUHUNA

Faculty of Engineering

End-Semester 4 Examination in Engineering: September 2023

Module Number: MN4304 Module Name: Marine Engineering Knowledge

[Three Hours]

[Answer all 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) State the factors that may affect the efficiency of air compressors. Explain their influences over the efficiency. [06 marks]
- b) Explain the necessity of compressed air used onboard ship. [04 marks]
- c) State with reasons the necessity of maintaining bumping clearance of an air compressor. [04 marks]
- d) If an air compressor fails to unload on starting, one or all of the following could occur. State the correct occurrence and give adequate reasons to support your answer.
- (i). Compressor would dangerously over speed
 - (ii). Air receiver pressure would be excessively low
 - (iii). Circuit breaker would open on starting
 - (iv). Compressor would pump lube oil
- [06 marks]
- Q2 a) Sketch and describe the operation of an electrohydraulic type four ram steering gear system. [08 marks]
- b) Distinguish clearly the operation between follow up and non-follow up steering gear systems. [02 marks]
- c) State four main assumptions made in designing an electric steering gear system. [04 marks]
- d) Sketch and describe a marine tele-motor transmitter, receiver and associated piping [06 marks]
- Q3 a) With reference to transmission line of a ship explain,
- (i). the Shafting line is angled and the lubricating oil tank is left open to the shaft even at stay. [04 marks]
 - (ii). Plummer blocks are of different designs according to their location. [02 marks]

- b) Sketch an oil lubricated stern tube and explain its operation. [08 marks]
- c) What general effects might be continued running at service speed followed by resonance in heavy weather have on marine machinery? [02 marks]
- d) State the abnormal stresses which may be imposed on:
- (i) intermediate shafting
 - (ii) tail shafting,
 - (iii) shafting coupling bolts,
 - (iv) thrust shaft
- [04 marks]

- Q4 a) State the methods of spreading and combating a fire respectively. [04 marks]
- b) Sketch and describe a Soda -Acid type portable fire extinguisher giving suitable chemical reactions caused during operation, indicating operating time, area of coverage and recharging after use. [08 marks]
- c) State the general information indicated on a portable fire extinguisher. [04 marks]
- d) Discuss about the preventive measures to be taken on Class C and Class D fires. [04 marks]

- Q5 a) What general effects might be continued running at service speed followed by resonance in heavy weather have on marine machinery? [02 marks]
- b) (i) Define the phenomenon 'cavitation' followed by reasons to cause it. [03 marks]
- (ii) Distinguish the types of cavitation and locations that they may cause on a Propeller. [03 marks]
- c) With reference to marine piping systems state the application of gland packings. [04 marks]

- b) Discuss the operation of a diesel/heavy fuel oil supply system for two stroke marine diesel engines operating at slow speed, by giving a suitable sketch.

[08 marks]

- Q6 a) With reference to deck machinery system installed on a ship explain the operation and construction of a Capstan used for mooring.

[05 marks]

- b) Draw timing diagrams to indicate both the 2 stroke and 4 stroke cycle to include all aspects of marine diesel engine operation.

[05 marks]

- c) Explain the procedure employed to check deflection of a crank shaft.

[05 marks]

- d) State causes for crank shaft deflection

[05 marks]