UNIVERSITY OF RUHUNA

Faculty of Engineering

End-Semester 5 Examination in Engineering: October 2019

Module Number: ME5312 **Module Name: Marine Engineering Knowledge**

[Three Hours]

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

Clearly labelled sketches will be given credits

Q1 a) Describe using simple diagrams as necessary, the principle of operation of a Reverse Osmosis System.

[5 Marks]

b) Sketch and describe a Waste Heat Recovery Evaporation Plant using main engine jacket water as the heating medium.

[5 Marks]

c) Distinguish the difference between boiling and flash evaporation.

[2 Marks]

Q2 a) Sketch a Turbo Oily Water Separator handling large quantities of contaminated water to maintain 15ppm and describe the passage of the oily/water mixture from the delivery pump and through the separator.

[6 Marks]

b) Describe the automatic oil discharge system associated with above separator.

[3 Marks]

c) State how oil density and temperature relate to the ease of separation of oil from water in an oily/water mixture?

[3 Marks]

Q3 a) Sketch and describe the operation of a D Type Bent Tube Water Tube Boiler.

[4 Marks]

b) Name and state the function of various mountings fitted to a marine boiler.

[4 Marks]

c) State Gauge Glass Blow Down Procedure applied to a boiler?

[4 Marks]

Q4 a) Draw a detailed diagram of a Vapour-Compression Cycle of Refrigeration and explain it with necessary thermodynamic processes.

[3 Marks]

b) Describe the operation of a Shell and Tube Type Double Pass Heat Exchanger with suitable sketches.

[3 Marks]

c) Explain why the performance of exhaust gas boilers and the quality of the steam produced is of low standard. Suggest with reasons how this standard can be improved by practices either directly or indirectly related to boiler management.

[6 Marks]

Q5 a) Sketch a simple cross section through a Single Stage Centrifugal Pump with a fully shrouded single entry impeller; name the components of the pump and indicate the direction of fluid flow

[4 Marks]

b) State type of impellers used with centrifugal pumps and the measures taken to balance the thrust during operation of a pump

[3 Marks]

c) Describe the necessity of a relief valve installed on a pump.

[2 Marks]

d) Prepare a list of mechanical related problems caused by a centrifugal pump.

[3 Marks]