UNIVERSITY OF RUHUNA

Faculty of Engineering

End-Semester 5 Examination in Engineering: August 2018

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

[Three Hours]

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

Provide neat sketches where necessary; state any reasonable assumptions made

Q1 Reverse osmosis is the modern alternative for shipboard production of drinking water.

a) Explain briefly the difference between Osmotic and Reverse Osmotic pressure.

[1.0 Mark]

b) Describe using simple diagrams as necessary, the principle of operation of a reverse osmosis system.

[04 Marks]

c) Sketch and describe a multi-stage flash type evaporator integrated with a salinometer and a three way dump valve.

[04 Marks]

d) Distinguish the difference between boiling and flash evaporation.

[1.0 Mark]

Q2 With reference to oily water separators:

a) Sketch, an Oily water Separator handling large quantities of contaminated water to maintain 15ppm and explain how it operates.

[5.0 Marks]

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

[3.0 Marks]

c) Why does oil carry over with water?

[2.0 Marks]

Q3 a) Sketch and describe the operation of a foster wheeler ESDI bent tube water tube boiler.

[4.0 Marks]

Q3 continues from next page

b) State the function of following mountings fitted to a Marine boiler.

(i)	Safety valve	(ii)	Main steam stop valve
(iii)	Water gauge	(iv)	Feed check valve
(v)	Auxiliary steam stop valve	(vi)	Salinometer cock

[3.0 Marks]

c) State gauge glass blow down procedure applied to a boiler.

[3.0 Marks]

Q4. With reference to refrigeration system installed onboard ship;

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

[3.0 Marks]

b) According to the location of evaporator and type of cargo that it preserves, state the methods of cooling with clear labeled sketches.

[2.0 Marks]

c) Sketch a diagrammatic arrangement of a fully automatic refrigeration system which supplies a number of cold compartments and explain it's operation.

[5.0 Marks]

Q5 a) State classification of all pumps used in marine practice.

[2.0 Marks]

b) Sketch and describe the operation and construction of a Positive Displacement double screw pump used in a pumping system.

[4.0 Marks]

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

[1.0 Mark]

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

[3.0 Marks]

Q6 a) Describe the operation of a plate type heat exchanger with suitable sketches.

[3.0 Marks]

b) Explain the back flushing system applied to regular maintenance of plate heat exchangers.

[3.0 Marks]

c) Give line diagrams to demonstrate the flow of liquids for ;

(i) Single and multi pass arrangement

(ii) Single & multi- multi pass arrangement

[4.0 Marks]