



# UNIVERSITY OF RUHUNA

Faculty of Engineering

End-Semester 5 Examination in Engineering: August 2018

Module Number: ME5326

Module Name: Marine Engineering Knowledge(O/C)

[Three Hours]

[Answer all questions; each question carries ten marks]

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Provide neat sketches where necessary; state any reasonable assumptions made

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- 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]