



**UNIVERSITY OF RUHUNA**

**Faculty of Engineering**

**End-Semester 5 Examination in Engineering: July 2017**

**Module Number: ME5312**

**Module Name: Marine Engineering Knowledge**

**[Three Hours]**

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

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**Clear labeled sketches will be given credits**

- Q1** With reference to oily water separators:
- a) Sketch, a Turbo oily water separator handling large quantities of contaminated water in order to give 15 ppm of product and explain, it's operation. [6 Marks]
  - b) Demonstrate with a suitable sketch and explain the automatic oil and water discharge arrangement of the separator. [3 Marks]
  - c) Explain the vapour compression cycle of a refrigeration system. [3 Marks]
- Q2**
- a) Sketch and describe Waste Heat Recovery Type Evaporation Plant using main engine jacket water as the heating medium. [3 Marks]
  - b) With reference to low pressure evaporators write short notes on followings:
    - (i) Boiling type evaporators
    - (ii) Educator condenser
    - (iii) Dump valve and salino-meter assembly[3 Marks]
  - c) Explain briefly the operation of a Reverse Osmosis System used onboard ship with a suitable sketch. [6 Marks]
- Q3**
- a) Classify the pumps used onboard ship according to type, function and mode of driving. [3 Marks]

b) Sketch and describe the operation of a gear pump. [3 Marks]

c) Discuss about mechanical suction problems caused with pumps. [3 Marks]

d) State type of static and dynamic heads assigned for pumps. [3 Marks]

Q4 a) Considering Cross flow heat transfer processes in heat exchangers explain;  
(i) Parallel flow  
(ii) Counter flow [2 Marks]

b) Explain the construction and operation of a shell and tube heat exchanger of double flow type. [4 Marks]

c) Illustrate the type of baffles used with tube section of a heat exchanger. [2 marks]

d) Explain the back flushing of system of plate type heat exchangers. [4 Marks]

Q5 a) Sketch and describe the operation and construction of a D type water tube boiler. [8 Marks]

b) Arrange a list of mountings (out fittings) attached to a Scotch boiler. [4 Marks]