



UNIVERSITY OF RUHUNA

Faculty of Engineering

End-Semester 5 Examination in Engineering: August 2015

Module Number: ME 5312 Module Name: Marine Engineering Knowledge (TE)

[Three Hours]

[Answer all questions, each question carries 10 marks,
Clearly labelled sketches will be given credit]

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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. [01 mark]
 - b) Describe using simple diagrams as necessary, the operation principle a reverse osmosis system. [04 marks]
 - c) Sketch and describe a double effect boiling type evaporator integrated with a salinometer and a three way dump valve. [04 marks]
 - d) Distinguish the difference between boiling and flash evaporation. [01 mark]
- Q2. With reference to oily water separators;
- a) Sketch a Turbo Oily Water Separator handling large quantities of contaminated water and explain how it operates. [05 marks]
 - b) Describe the automatic oil discharge system integrated with the above separator. [03 marks]
 - c) Why does oil carry over with water? [02 marks]
- Q3. a) Sketch and describe the operation of a foster wheeler D-type bent tube water tube boiler. [04 marks]
- b) State the functions 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[03 marks]
 - c) State the gauge glass blow down procedure applied to a boiler? [03 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. [03 marks]
 - b) With reference to the location of evaporator and type of cargo that it preserves; state the methods of cooling with clear labeled sketches. [02 marks]
 - c) Sketch a diagrammatic arrangement of a fully automatic refrigeration system which supplies a number of cold compartments and explain its operation. [05 marks]
- Q5. a) State with classifying all the pumps used in marine practice. [02 marks]
- b) Sketch and describe the operation and construction of a Positive Displacement double screw pump used in a pumping system. [04 marks]
 - c) Describe the necessity of a relief valve installed on a pump. [01 mark]
 - d) Prepare a list of mechanical related problems caused in a centrifugal pump. [03 marks]
- Q6. a) Distinguish clearly the difference between bracket floor and solid floor giving suitable sketches. [02 marks]
- b) With reference to structural sub-assemblies, sketch an arrangement of a General Cargo Ship showing brackets, stiffeners, scallops, cutouts, floors, lightening holes, struts, bracket floors, solid floors, etc. [04 marks]
 - c) Give definitions, explain the following terms briefly.
 - i) TEU and FEU
 - ii) Net tonnage and Gross tonnage of a ship.
 - iii) Displacement and volume of displacement of a ship.
 - iv) Barrel and cubic bail. [04 marks]