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**B.Tech. Degree VI Semester Supplementary Examination in
Marine Engineering June 2022**

**MRE 1605 MARINE REFRIGERATION AND AIR CONDITIONING
(2013 Scheme)**

Time: 3 Hours

Maximum Marks: 100

(5 × 20 = 100)

- I. (a) Sketch and explain a simple vapour compression refrigeration system along with the p-H and T-S diagrams. (10)
- (b) Discuss the effect of the following on COP of a vapour compression refrigeration system: (10)
- (i) Use of flash chamber
 - (ii) Sub-cooling of liquid refrigerant using vapour refrigerant
 - (iii) Sub-cooling by external cooling source
 - (iv) Variation in suction pressure
 - (v) Variation in discharge pressure.
- OR**
- II. (a) Explain with the help of a neat sketch, the working of an ammonia-water absorption refrigeration system. (10)
- (b) For a vapour compression refrigeration system, discuss the following with the help of a p-H diagram: (10)
- (i) Work of compression
 - (ii) Heat rejection
 - (iii) Refrigerating effect
 - (iv) Coefficient of performance
 - (v) Mass flow rate.
- III. (a) Sketch and explain a compound refrigeration system with multi-stage compression and a flash chamber. (12)
- (b) List the desirable properties of a refrigerant. (8)
- OR**
- IV. (a) Briefly explain how to arrive at the total heat load for which a refrigeration plant has to be designed. (10)
- (b) Write short notes on: (10)
- (i) Effect of refrigerants on environment
 - (ii) Montreal Protocol.
- V. What are the functions of a throttling device in a refrigeration system? With the help of a neat sketch explain the working of a thermostatic expansion valve. (20)
- OR**
- VI. Explain the various control and safety equipments used in a refrigeration system with the help of relevant sketches. (20)

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- VII. Explain the purpose and working of a cooling tower. Discuss the types of cooling towers with the help of neat sketches. (20)
- OR**
- VIII. Draw a psychrometric chart showing the various constant parameter lines. Explain the various psychrometric properties of moist air. (20)
- IX. Write short notes on: (20)
- (i) Design and construction of ducts
 - (ii) Different types of fans used in air conditioning system
- OR**
- X. (a) Sketch and describe a zone control type air conditioning system used in a ship. (10)
- (b) Briefly explain how heat load calculation of an air conditioning plant is done. (10)
