

B.Tech Degree VI Semester Examination in Marine Engineering May 2012

MRE 605 MARINE REFRIGERATION AND AIR CONDITIONING

Time : 3 Hours

Maximum Marks : 100

- I. (a) Explain with sketches the ideal cycle for compressors. (8)
 (b) With the help of PV diagram, derive an expression for the work transferred in a single stage compressor without clearance volume. (12)
- OR**
- II. (a) Describe in detail the effect of clearance volume on the volumetric efficiency. (10)
 (b) A single stage single acting compressor delivers 14 M^3 of free air per minute from 1 bar to 7 bar. The speed of the compressor is 310 rpm. Assuming that compression and expansion follow the law $PV^{1.35} = \text{constant}$ and clearance is 5% of swept volume, find the dia and stroke of compressor. Take $L = 1.5D$. The temperature and pressure of air at the suction are same as atmospheric air. (10)
- III. (a) Sketch and describe a refrigeration plant with multiple evaporator system. (10)
 (b) Explain the terms “ Co-efficient of Performance” and “Refrigerating Effect”. (10)
- OR**
- IV. (a) Describe with the help of a sketch, the cascade system of refrigeration used for liquifaction of gases in gas carriers. (10)
 (b) Explain with sketches a typical marine refrigeration plant with multi compression system. (10)
- V. Write short notes on: (20)
 (i) Charging of refrigerant in the system
 (ii) Purging of air from the system
 (iii) Survey of refrigeration equipments
 (iv) Secondary refrigerants.
- OR**
- VI. (a) Sketch and describe thermo static expansion valve used in the refrigeration system. (8)
 (b) What are the important factors to be considered for the operation and maintenance of refrigeration plants? (12)
- VII. Describe clearly the terms, specific humidity and Relative humidity and explain the importance of them (20)
- OR**
- VIII. Write short notes on: (20)
 (i) Volumetric and gravimetric analysis of gas mixtures
 (ii) Advanced problem in adiabatic mixing
 (iii) Gibb-Daltan’s law
 (iv) Equivalent molecular weight
- IX. (a) Explain the necessity of air conditioning on board ships. (6)
 (b) Describe in detail psychometric properties of air and their importance in comfort air conditioning. (14)
- OR**
- X. (a) What do you understand by “balancing of system” in air conditioning? Explain in detail. (10)
 (b) Sketch and explain single duct system of air conditioning used on board ships. (10)