B. Tech. Degree VI Semester Examination in Marine Engineering June 2015

MRE 605 MARINE REFRIGERATION AND AIR CONDITIONING

Time: 3 Hours   Maximum Marks: 100

(5 × 20 = 100)

I. (a) With the help of a PV diagram derive an equation for the work done in a two stage compressor without clearance volume.   (10)

   (b) Write short notes on: (i) Free air delivery (ii) Ideal cycle for compressors.   (10)

OR

II. (a) Derive an equation for the condition for minimum work input and perfect intercooling.   (10)

   (b) An air compressor takes in air at 1 bar and 24°C and compresses it as per $PV^{1.3}=C$. and delivers to a receiver at a constant pressure of 12 bar. If R=0.287KJ/Kg.K, determine the temperature at the end of compression and work done and heat transferred during compression per Kg of air.   (10)

III. (a) Sketch and describe the indirect system of refrigeration system used in liquefied gas carriers.   (10)

   (b) Sketch and explain a typical multi stage compression system with intercooling used in a ship.   (10)

OR

IV. Write short notes on:

   (a) Coefficient of performance.   (6)
   (b) Desired properties of refrigerants generally used on board ships.   (7)
   (c) Importance of Montreal Protocol.   (7)

V. (a) Explain the functions of a thermostatic expansion valve(TEV) used in a refrigeration system and with the help of a sketch, explain how those functions are done by a TEV.   (10)

   (b) Describe the importance of insulation in a refrigeration system and explain the different types of insulating materials used on board stating their advantages and disadvantages.   (10)

OR

VI. Write short notes on:
   (a) Methods of air circulation in cargo holds.   (7)
   (b) Preparation for loading survey in reefer ships.   (6)
   (c) Operation and maintenance of refrigeration plants.   (7)

VII. (a) Distinguish Dalton's Law and Amagat's Law with reference to mixtures of gases and vapours.   (8)

   (b) Explain the terms "Relative Humidity", "Wet bulb temperature" and "Dew Point" and describe their importance in a refrigeration system.   (12)

OR

VIII.		Write short notes on:	
		(a) Molecular weight and gas constant.	(7)
		(b) Principle of cooling towers.	(7)
		(c) Volumetric and gravimetric analysis of gas mixtures.	(6)

IX.   (a)   Sketch and describe a zone control type air conditioning system used in a ship.   (10)

       (b)   Explain the need for air conditioning on board ships and "air comfort conditions".   (10)

OR

X.   (a)   Explain why HEPA filters used for air conditioning of clean rooms. Describe the said filter with a sketch.   (10)

       (b)   Describe why and how balancing of temperature and air quantity is done before commissioning an air-conditioning system.   (10)

***