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Total No. of Pages : 02

Total No. of Questions : 09

B.Tech.(Marine Engineering) (2013 Onwards) (Sem.-7)

REFRIGERATION AND AIR CONDITIONING

Subject Code : BTME-804

M.Code : 74248

Time : 3 Hrs.

Max. Marks : 60

INSTRUCTIONS TO CANDIDATES :

1. SECTION-A is COMPULSORY consisting of TEN questions carrying TWO marks each.
2. SECTION-B contains FIVE questions carrying FIVE marks each and students have to attempt any FOUR questions.
3. SECTION-C contains THREE questions carrying TEN marks each and students have to attempt any TWO questions.
4. Assume any missing data.
5. Refrigeration charts and tables are allowed.

SECTION-A**1. Answer briefly :**

- a) Define COP of a refrigerator.
- b) What do you understand by mechanical refrigeration?
- c) Explain the term "tonne of refrigeration".
- d) What is superheating?
- e) What is the effect of suction pressure on performance?
- f) What is the function of absorber?
- g) What is an azeotrope?
- h) What are the factors affecting comfort air conditioning?
- i) Why condensers are used in an air conditioning system?
- j) Define wet bulb temperature.

SECTION-B

2. An air refrigerator works between the pressure limits of 1 bar and 5 bar. The temperature of the air entering the compressor and expansion cylinder are 10°C and 25°C respectively. The expansion and compression follow the law $p v^{1.3} = \text{constant}$. Find the theoretical C.O.P. of the refrigeration cycle.

3. Establish how an actual cycle differs from a theoretical vapour compression cycle.
4. Discuss the advantages of vapour absorption refrigeration system over vapour compression system.
5. Discuss the environmental aspects of conventional refrigerants.
6. A quantity of air having a volume of 300 m^3 at 30°C dry bulb temperature and 25°C wet bulb temperature is heated to 40°C dry bulb temperature. Estimate the amount of heat added, final relative humidity and wet bulb temperature. The air pressure is 1.01325 bar.

SECTION-C

7. A two stage compression ammonia refrigerating system with water and flash intercooling and water sub-cooling operates between overall pressure limits of 13.89 bar and 1.9 bar. The flash intercooler pressure is 4.97 bar. The temperature of refrigerant leaving the water intercooler and the water sub-cooler is limited to 30°C . If the load is 10 TR, find :
 - a) Coefficient of performance of the system.
 - b) Power required to drive each compressor.
 - c) Swept volume for each compressor assuming the volumetric efficiency for both the compressor as 80%.
8. Explain with the help of a neat sketch the working of mixed refrigeration system.
9. A cinema hall with seating capacity of 1500 persons has been provided with an air-conditioning plant with the following data :

Outdoor conditions	: 40°C DBT and 20°C WBT
Required indoor conditions	: 20°C DBT and 60% RH
Amount of outdoor air supplied	: $0.3 \text{ m}^3 / \text{min} / \text{person}$

If the required condition is achieved first by adiabatic humidifying and then by cooling, Find :

- a) The capacity of cooling coil and surface temperature of the coil if by-pass factor is 0.25
- b) The capacity of the humidifier and its efficiency.

NOTE : Disclosure of Identity by writing Mobile No. or Making of passing request on any page of Answer Sheet will lead to UMC against the Student.