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Total No. of Pages : 02

Total No. of Questions : 09

B.Tech (ME) (Sem.-6)

REFRIGERATION AND AIR CONDITIONING

Subject Code : ME-304

Paper ID : [A0820]

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.

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

- a. Show heating and dehumidification process on psychometric chart.
- b. What are various sources of heat load?
- c. What is a hermetically sealed compressor?
- d. Explain Cascade refrigeration system and also give its advantages.
- e. List psychometric properties of air.
- f. Differentiate sensible and latent heat load.
- g. Define the term COP of a refrigeration system. What are factors affecting COP of a refrigeration system?
- h. Differentiate between specific humidity and relative humidity.
- i. What are engineering applications of cryogenics?
- j. List psychometric properties of air.

SECTION-B

2. Explain the cascade refrigeration system with P-H and T-S.
3. What is simple air cooling system and explain it with neat and clean line diagram?
4. a) Describe the refrigerating properties of ammonia for use in domestic and commercial type of refrigerating appliances.
b) How will you assign number to the refrigerants methyl chloride and tetrachloroethane?
5. A dense closed cycle refrigeration system working between 4 bar and 16 bar extracts heat at the rate of 126 MJ /hour. The air enters the compressor at 5 °C and expander at 20 °C. Assuming that the unit runs at 300 rpm, determine : power required to run the unit, COP of unit, bore of compressor, refrigeration capacity in TR. The expander and compressor are double acting and stroke for compressor and expander is 300 mm. The mechanical efficiency of the compressor is 80%. The mechanical efficiency of expander is 85%. Assume that the compression and expansion are isentropic.
6. Discuss briefly the different types of heat loads which have to be taken into account in order to estimate the total heat load of a large restaurant for summer air conditioning.

SECTION-C

7. Write a short note on the following :
 - a) Expansion devices.
 - b) Window and Package air conditioning system.
8. A Bell Coleman refrigeration cycle, air is drawn from cold chamber at 1.0 bar and compressed to 6 bar in the compressor. The compression and expansion indices are 1.25 and 1.30 respectively. Obtain COP and Tonnage of the unit for an air flow rate of 0.5 kg/sec. Neglect the clearance volume and take temperatures at the beginning of compression and expansion to be 7°C and 37°C respectively. If the compression and expansions are isentropic, how the result will be modified.
9. A dehumidifier spray washer is chosen to operate under the following conditions Inlet air conditions: 28°C DBT, 21°C WBT; Outlet air conditions: 10°C DBT, 6°C WBT; Volume of air handled is 2000 cubic meter/minute; the chilled water inlet and outlet temperature are 7°C and 12°C respectively. Evaluate cooling load on the coil, water flow rate through the coil.