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Roll No										

B.E / B. Tech. (Full Time) DEGREE END SEMESTER EXAMINATIONS, NOV / DEC 2012

AGRICULTURAL AND IRRIGATION ENGINEERING BRANCH

VI SEMESTER

ME 9037 – Refrigeration and Air conditioning

(REGULATIONS 2008)

Time : 3 hr Max mark : 100

Instructions : Use of approved Tables, Charts are permitted

Answer ALL Questions

PART – A (10 x 2 = 20 Marks)

1. Explain the term wet compression.
2. Write the chemical formula of refrigerant R600a and R717.
3. Draw schematic of cascade refrigeration system.
4. List down the capacity controls employed in screw compressors.
5. What is the function of absorber in vapour-absorption refrigeration system?
6. Define figure of merit with respect to thermoelectric cooling system.
7. Define apparatus dew point temperature.
8. Clearly differentiate between absolute humidity and specific humidity.
9. What do you meant by the term stack effect in summer air conditioning?
10. Outline the three common methods used of the sizing of ducts.

PART B (5 x 16 = 80 Marks)

11. (i) Explain using p-h and T-s diagram working principle of actual vapour compression cycle. (8)
(ii) Discuss the desired thermodynamic and transport property characteristics of refrigerants suitable for vapour compression refrigeration systems (8)

12. (a) A two stage compression system with a flash intercooler is to produce 50 TR of cooling while working between -30°C and 45°C. The pressure in the flash intercooler is the geometric mean of the upper and lower pressure limits. Sketch the system and cycle on P-h diagram giving the property values. Assume isentropic efficiency of the both compressor are at 85 %. The working medium is R134a. Find the coefficient of performance of the system.

OR

(b) Explain the working principle of centrifugal refrigerant compressor and compare its performance with reciprocating and screw compressors of same cooling capacity.

13. (a) Discuss the principle of operation with neat schematic of (i) Steam jet refrigeration system (ii) Thermoelectric cooling system

OR

(b) (i) What are the two main thermodynamic requirements for the refrigerant-absorbent mixtures for the absorption cooling system? (6)
(ii) Explain the working principle of ammonia-water absorption cooling system along with its merits and demerits compared to the ammonia based vapour compression cooling system. (10)

14. (a) (i) Express the relations among relative humidity, degree of saturation, and saturation pressure corresponding to mixture temperature. (6)
(ii) 300 m^3/min of air at T_{db} = 40°C and T_{wb}=25°C is mixed with another stream of air 700 m^3/min having T_{db} = 25°C and RH = 50 %. The mixture is cooled by a cooling coil until the temperature is reduced to 15°C having SHF = 0.55. Find the final condition, heat removed by the cooling coil, tonnage of the cooling coil and moisture removal by the cooling coil. (10)

OR

(b)(i) Discuss the four commonly used methods to dehumidify the moist air in a typical air-conditioning system. (8)
(ii) Moist air at a state of 21°C dry-bulb, 15°C wet bulb enters a spray chamber. If, for each kilogram of dry air passing through the chamber, 0.002 kg of water at 100°C is injected and totally evaporated, calculate the moisture content, enthalpy and dry bulb temperature of the moist air leaving the chamber. (8)

15. (a) State the conditions of the indoor environment that should be satisfied for a person to feel comfortable. Explain those conditions are the under control of the air conditioning system and discuss how other conditions are achieved for comfort.

OR

(b) Explain different applications of refrigeration along with its methods of working, advantages, environmental issues and economics.