Marks Scored:

KATHMANDU UNIVERSITY
End Semester Examination [C]
July, 2017

Level : B.E.
Year : IV
Course : MEPP 403
Semester : I
Exam Roll No. :
Time: 30 mins.
F. M. : 20
Registration No. :
Date JUL 13 2017

SECTION "A"
[10 Q × 1 =10 marks]

Mark [√] for the most appropriate answer (s).

1. The value of COP in vapor compression cycle is always
   a. Less than unity b. More than unity c. equal to unity d. unpredictable

2. If a heat pump cycle operates between the condenser temperature of 27°C and evaporator temperature of -23°C, then the Carnot COP will be .....
   a. 2 b. 4 c. 6 d. 8

3. The color of the flame of halide torch, in case of leakage of Freon refrigerant, will change to .....
   a. Bright green b. Light yellow c. Orange d. Red

4. The optimum effective temperature for human comfort is
   a. Higher in winter than in summer b. Same in winter and summer
   c. Lower in winter than in summer d. Lower in summer than in winter

5. When flash gas removal is used in a multistage compression, it ..... the work to be done in high pressure compressor.
   a. increases b. makes no difference
   c. reduces d. is unpredictable

6. Multi..... systems are widely used when refrigeration is required at different temperatures.
   a. Condenser b. compression c. evaporator d. vapor

7. Ventilation requirement depends on .....and also on activity level.
   a. Internal load b. external load c. occupancy d. temperature

8. The absolute humidity .....during cooling and humidification process.
   a. Increases b. decreases c. remain constant d. unpredictable

9. For southern hemisphere providing fenestration on
   a. northern side of the building is beneficial for winter heating
   b. southern side of the building is beneficial for winter heating
   c. any direction does not have any effect on winter heating
   d. any direction have same effect on winter heating

10. The fluids used in Electrolux refrigerator are
    a. Water and hydrogen b. Ammonia, water and hydrogen
    c. Ammonia and hydrogen d. Carbon dioxide, ammonia and hydrogen

SECTION "B"

[10 Q. × 1 = 10 marks]

Fill in the blanks.

11. The refrigerants with designation R113 has the chemical formula .....

12. In summer air-conditioning system for hot and humid outdoor conditions, the required comfort conditions are obtained by employing.....process.

13. An assembly of different parts of the system used to produce specified condition of air with a required space building is called .....

14. Air refrigeration works on .....cycle.

15. An azeotropic mixture of two substances is one which cannot be separated into its components by .....

16. The .....is the usual refrigerant for aero plane refrigeration system.

17. The outdoor air enters into the air-conditioning space through window cracks and through doors when opened is termed as .....

18. The cooling load temperature difference (CLTD) incorporate the effects of .....

19. The by-pass factor (BPF) of the coil ..... as the number of rows in the flow direction increase.

20. Room sensible heat factor is the ratio of .....

KATHMANDU UNIVERSITY
End Semester Examination [C]
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JUL 13 2017

Level : B.E.
Year : IV
Time : 2 hrs. 30 mins.

Course : MEPP 403
Semester : I
F. M. : 55

SECTION "C"

[5Q × 11 = 55 marks]

Attempt ALL questions. Assume suitable data if any is missing.

1. a. Explain with the help of a diagram the advantage of dry compression and throttling instead of wet compression and isentropic expansion in a vapor compression refrigeration system. [5]
   b. The simple LiBr-water absorption refrigeration cycle is operating at the following temperatures: generator, 95 °C; condenser, 40 °C; evaporator, 10 °C; and absorber 35 °C. Compute the flow rate of refrigerant through the condenser and evaporator in the cycle if the pump delivers 0.6 kg/s. (Draw a schematic diagram and level all components with temperature). [6]

2. a. Explain cascade refrigeration system for the production of low temperature. Sketch schematic and T-S diagram and level all components and processes of the cycle. [6]
   b. In an aircraft, cabin cooling is required even though the outside temperature is very low at high altitudes. Explain why cooling is required at this high altitude and also describe which kind of refrigeration system is used for it and why. [5]

3. a. A multi-purpose hall is to be air conditioned for 1200 seating capacity when the outdoor conditions are 39 °C DBT and 20 °C WBT and required conditions of the hall are 20 °C and 60% RH. If the quantity of air supplied is 0.3 m3/min/person and the process occurs at 1 atm, find the following: [8]
      i. Capacity of the cooling coil in kW,
      ii. The surface temperature required if the bypass factor of the cooling coil is 0.3, and
      iii. The capacity of the humidifier in kg/h.
      The required condition is achieved first by adiabatic humidification and then cooling. (Sketch the process in a Psychometric chart and leave it along with your answer sheet)
   b. Write a short note on 'thermodynamics of a human body' and explain briefly the factors which affect human comfort. [3]

4. a. Classify air conditioning systems based on fluid media used in the thermal distribution system. Describe briefly "all water" air conditioning system. [5]
   b. Saturated air leaving the cooling section of an air-conditioning system at 14°C at a rate of 50 m3/min is mixed adiabatically with the outside air at 32°C and 60 percent relative humidity at a rate of 20 m3/min. Assuming that the mixing process occurs at a pressure of 1 atm, determine the specific humidity, the relative humidity, the dry-bulb temperature, and the volume flow rate of the mixture. [6]

5. a. What is flash gas removal and intercooling in multi stage compression refrigeration system? Explain how flash gas removal and intercooling works with the help of a schematicand T-S diagram for multistage compression. [6]
   b. Explain briefly about refrigerants, heat pump and throttling value. [5]

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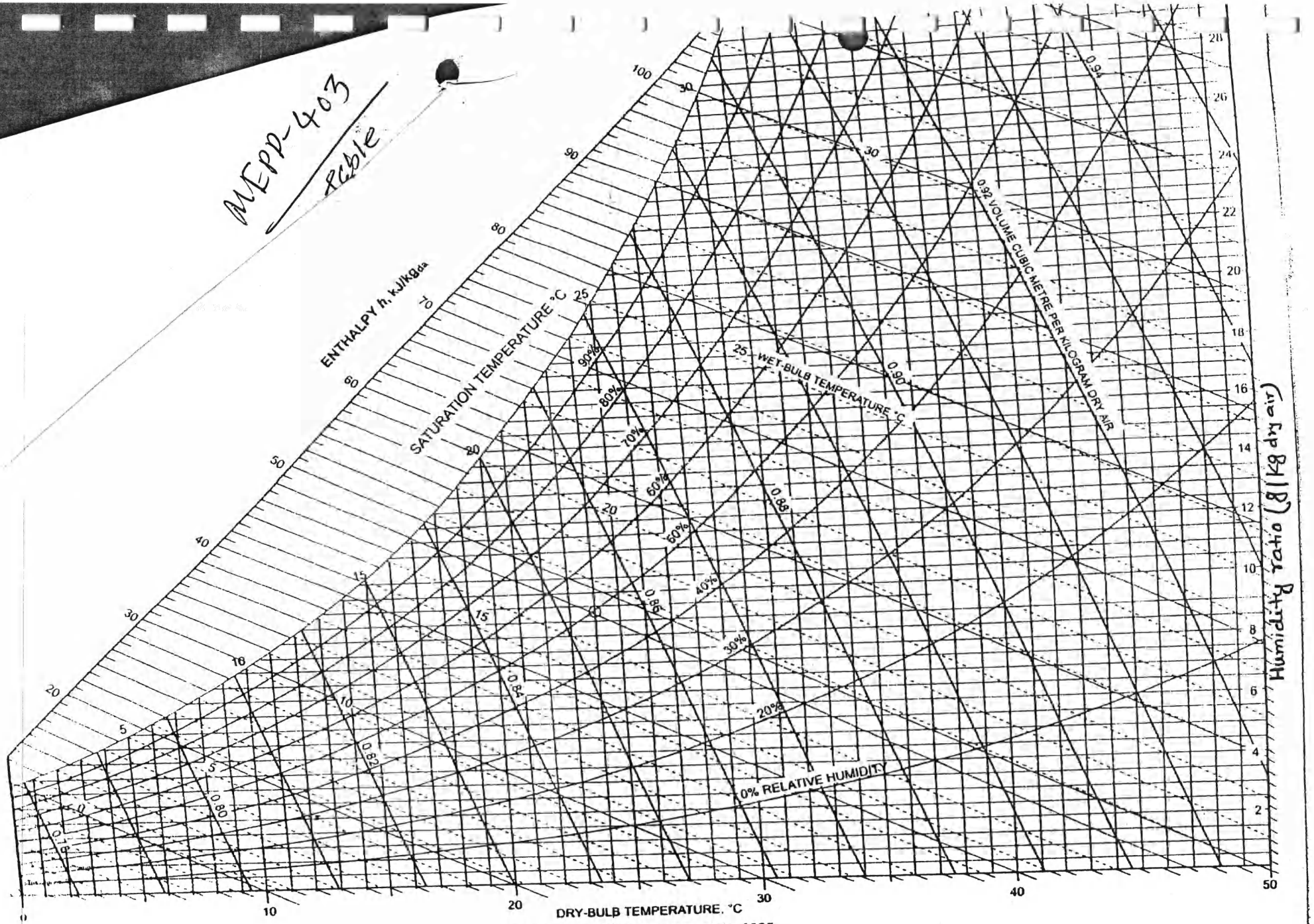
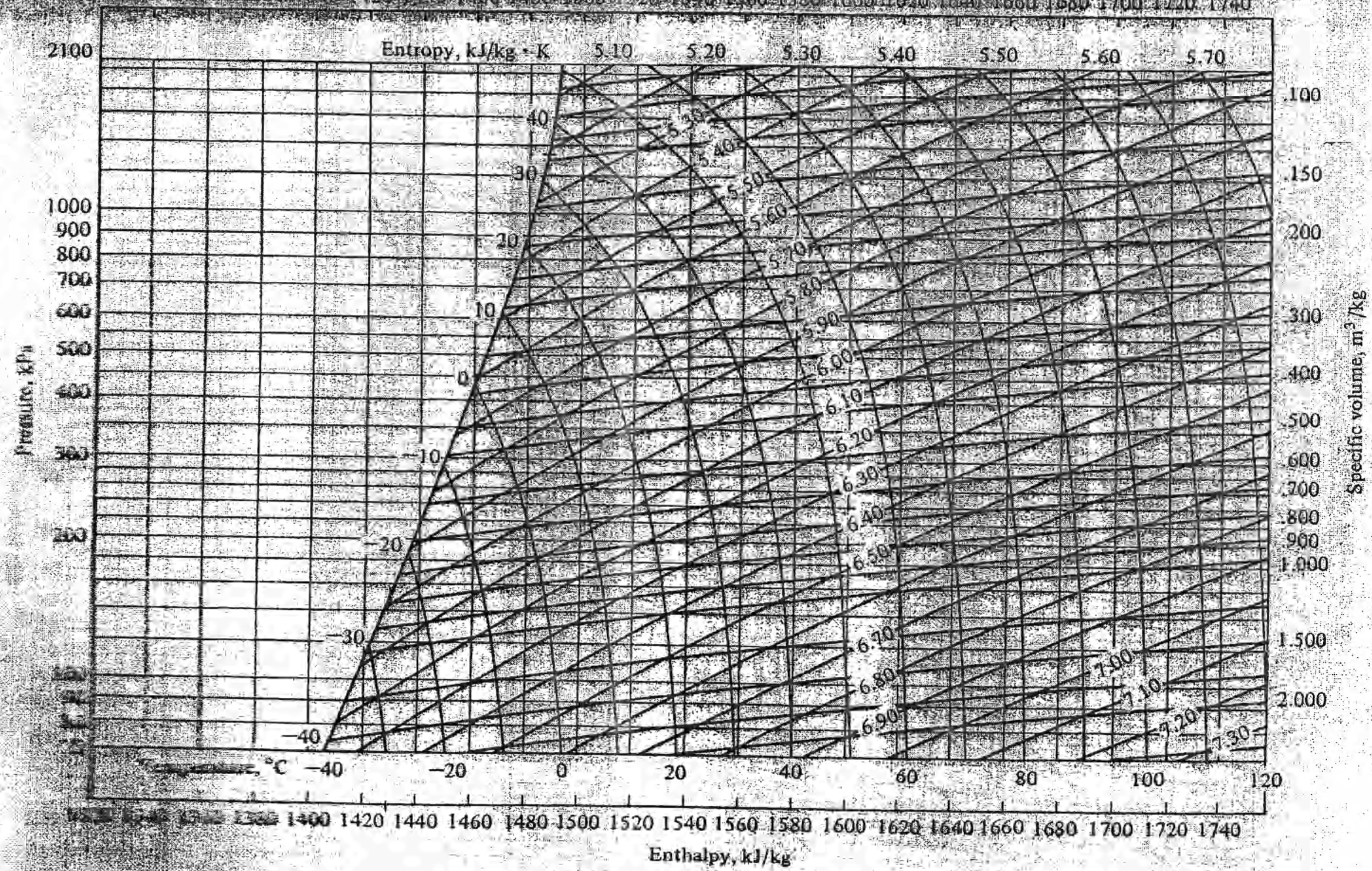


ASHRAE Handbook Fundamentals, 2005

Appendix C-7: Psychrometric Chart



of superheated ammonia vapor. *(Prepared for this book by the Technical University of Denmark from Data*

Figure 17.8 Temperature-pressure-concentration diagram for saturated lithium bromide solutions. Developed from data in Ref. 1.

Lithium bromide in solution, % by mass