Registration No: | | | | | | | | | | |

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M.TECH
HTPC103

1st Semester Regular/Back Examination – 2014
ADVANCED REFRIGERATION ENGINEERING
BRANCH(S): THERMAL POWER ENGINEERING,THERMAL ENGINEERING,HEAT POWER ENGINEERING,HEAT POWER & THERMAL ENGINEERING

Time: 3 Hours
Max Marks: 70

Answer Question No.1 which is compulsory and any five from the rest.
The figures in the right hand margin indicate marks.

Q1 Answer the following questions: (2x10)

a) The temperature of moist air increases/decreases during chemical dehumidification? Justify your answer.
b) What is the state of the refrigerant vapour leaving the flash chamber in Multipressure refrigeration system?
c) Why the psychrometric chart, meant for 1.0 bar pressure, can not be used for any other pressure without modification?
d) What is a power fluid in a thermostatic expansion valve?
e) What is the difference between flooded type and dry type evaporators?
f) What is the role of hydrogen gas in three- fluid refrigeration system?
g) What is the use of an air washer?
h) Define the humid specific heat.
i) Show that partial pressure of water vapour in moist air is directly proportional to humidity ratio.
j) Write at least one advantage and one disadvantage of capillary tube over expansion valve.

Q2 Compare the performance of Single stage saturation vapour compression refrigeration cycle with that of Reversed Carnot cycle stating the losses/ gains using the same T-s diagram. (10)

Q3 a) Discuss the desirability of lubricating oil solubility with the refrigerants. (5)
b) Discuss the balancing point of compressor and capillary tube. (5)

Q4 A Refrigeration system is operating between temperature limits of -15°C and 45°C. It has a four cylinder compressor, each with a bore of 10 cm and stroke of 11.5 cm, and runs at 750 rpm. Assuming a clearance volume ratio as 0.045 Find the i) clearance volumetric efficiency, ii) swept volume, iii) the mass flow rate, iv) the refrigeration capacity, v) COP of the system. (10)

Q5 The following data refers to a LiBr-H_2O refrigeration system. Operating temperatures of Generator 120°C, Condenser 40°C, Evaporator 5°C, Absorber 30°C. The mass of solution delivered by the pump is 0.45 kg/s. The mass fraction of Li Br in strong solution is 0.55 and that in the weak solution is 0.7. Specific enthalpy of solution at the entry to the generator is 70 kJ/kg and the enthalpy of weak solution at the exit of the generator is 325 kJ/kg. Assume the saturated state of water at other points. Find the COP of the system. (10)

Q6 Moist air enters a cooling coil at 42°C and 65% RH at standard atmospheric pressure. It leaves the cooling coil as saturated air at 24°C. The condensate also leaves at 24°C. The mass flow rate of air is 120 kg of d.a./min. Determine the condensate rate and the cooling capacity in TR. (10)

Q7 Explain with neat schematic and P-h diagrams the principle of producing dry ice. Write its two applications. (10)

Q8 Write Short Notes (Any Two) (5 x 2)

a) Azeotropic mixture of refrigerants
b) Magnetic refrigeration principle
c) Cooling Tower
d) Joule-Thompson Coefficient