Code No: D2109 **R09**

JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY HYDERABAD
M.TECH II - SEMESTER EXAMINATIONS, APRIL/MAY 2012
REFRIGERATION AND AIR CONDITIONING
(THERMAL ENGINEERING)

Time: 3hours **Max. Marks: 60**

Answer any five questions
All questions carry equal marks
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1.a) Explain how the Reserved Carnot cycle is modified into ideal vapor compression cycle.

b) A refrigerating plant works between -10^0C to 40^0C when R-12 is used as refrigerant. A compressor used has two cylinders and the diameter and the stroke are 56.5mm and 50mm respectively. If the clearance is 4% of the stroke and compressor runs at 1450 RPM, find the following:
(a) Refrigerating capacity of the plant,
(b) Power required to run the compressor,
(c) COP of the system.

2.a) Explain the effect of sub cooling liquid refrigerant and super heating of suction vapor refrigerant on the performance of vapor compression cycle.

b) An Ammonia refrigerator produces 30 tons of ice from and at 0^0C in 24 hours. The temperature range of the compressor is from -15^0C to 25^0C. The vapor is dry saturated and the liquid refrigerant is sub cooled by 5^0C. Assume actual COP to be 60% that of theoretical COP. Calculate the power required to drive the compressor. Latent heat of ice is 335kJ/kg.

3.a) With the help of neat diagram, explain the working of modified Ammonia-Water absorption refrigeration system.

b) Write about the application of thermoelectric Refrigerator.

4. Write short notes on the following.
(a) Air curtain
(b) Vortex tube refrigerator
(c) Li-Br absorption system.

5. A laboratory has 25kW sensible heat and 20 kW latent load. The inside design conditions are 22^0C DBT and 50% RH. And the outside design conditions are 40^0C DBT and 27^0C WBT. The ventilation air used is 80 m^3/min. A cooling coil with a bypass factor of 0.05 must be used. An apparatus DPT is 10^0C. Determine:
(a) Amount of reheat required,
(b) Supply air quantity,
(c) DBT and WBT of air entering and leaving the apparatus
(d) Supply air temperature.

6. The total sensible and latent heat loads in a theatre are 1,50,00 KJ/hr and 62,000 KJ/hr respectively. The out door conditions are 35^0C DBT and 29^0C WBT. The indoor conditions are 22^0C DBT and 50% RH. The ventilation air required for the theatre is 170m^3/min. The temperature of the air entering the theatre should not exceed 14.5^0C. Calculate the following:
(a) Conditions of air entering and leaving the conditioner
(b) The flow rate of air passing through the conditioner
(c) The cooling coil capacity.

7.a) Explain in detail the methods of duct design and advantages of each.
b) Explain what is meant by pasteurization and freeze drying? Explain them in detail.

8.a) Explain what is meant by comfort zone and comfort conditions? Explain them with numerical values and necessary graphs.
b) What is meant by ventilation and why it is required? Explain them briefly.

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