Code No: G2106/R13

M. Tech. I Semester Supplementary Examinations, Jan/Feb-2018
REFRIGERATION AND AIR CONDITIONING
(Thermal Engineering)

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

Answer any FIVE Questions
All Questions Carry Equal Marks

1. a Discuss the methods used to improve the performance of vapour compression refrigeration system.
   b With a neat sketch explain the working of flooded type evaporator and dry expansion type evaporator.

2. a A food storage plant requires a refrigeration system of 12 tons capacity at an evaporator temperature of -10^0C and condenser temperature is 25^0C. The refrigerant NH_3 is sub cooled by 5^0C before entering the throttling valve and vapour leaving the evaporator coil is 0.97 dry. C_{pl}=4.62 kJ/kg^{0}K, C_{pg}=2.8 kJ/kg^{0}K. Determine the COP and power required to run the plant.
   Use the following properties.

Sat. Temp	Sp. Enthalpy		Sp. Entropy	
	h_f	h_g	S_f	S_g
25	537.6	1708	4.612	8.54
-10	376.3	1675	4.03	10.23

   b Explain the working of compound compression system with water inter cooler and single expansion valve. Indicate the processes on T-s plot.

3. a Explain in detail the procedure used in the liquefication of hydrogen.
   b What modifications are necessary in a simple absorption refrigeration system in order to improve the performance of the system?

4. a Explain the working of a system used for the production of Dry ice. "The production of Dry ice is more difficult in hot summer compared with winter season" Discuss.
   b Derive the theoretical COP of absorption refrigeration system and compare it with carnot COP. If T_g is the generator temperature and T_e is the evaporator temperature, represent the effect of T_g and T_e on COP with the help of p-h chart.

5. a Explain the working of Bootstrap regenerative air cooling system. Indicate the processes on T-s plot.
   b With a neat sketch explain the working of thermoelectric refrigeration system.

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6. a   Compare winter and summer air conditioning. Explain the working of summer air conditioning system.
    b   100 m^3 of air per minute at 30^{0}C DBT and 60% RH is cooled to 20^{0}C DBT by passing through a cooling coil. Find the following
        i) Capacity of cooling coil in tons of refrigeration, ii) RH of coming out air and its WBT. Take atmospheric pressure as 1.033 bar.

7. a   An air conditioning space is maintained at 27^{0}C DBT and 50% RH. When the ambient condition is 40^{0}C DBT and 27^{0}C WBT. The sensible heat load in the space is 14 kW. The air is supplied to the space at 7^{0}C and saturated condition. Determine
        i) Air supplied to the space, ii) Latent heat load in the space, iii) The cooling load of the coil if 70% of total air is recirculated.
    b   Explain the working of impact type humidifier and atomization type humidifier.

8. a   Write the limitations and applications of Steam jet refrigeration system.
    b   Explain the parameters that influence the effective temperature.
    c   Discuss the properties of ideal refrigerant

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