Code No : 9A03604/R09

B.Tech III Year II Semester Regular & Supplementary Examinations

Set-3

April/May - 2013

REFRIGERATION AND AIR CONDITIONING

(Mechanical Engineering)

Time: 3 Hours | Max. Marks: 70

*Answer any **FIVE** Questions*

*All Questions carry **Equal** Marks*

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1. (a) Explain open cycle and closed cycle air refrigerator working on a Bell-Coleman cycle.

   (b) Why air is used as a refrigerant in air crafts?

2. (a) Why in practice a throttle valve is used in V.C.R system rather than an expansion cylinder to reduce pressure between condenser and the evaporator?

   (b) Determine the theoretical C.O.P. for CO_2 machine working between the temperature range of 25°C and – 5°C. The dryness fraction of CO_2 gas during the suction stroke is 0.6. The following properties are given,

Temp (°C)	Heat kJ/kg		Latent Heat	Entropy (kJ/kg)	
	Liquid	Vapour	(kJ/kg)	Liquid	Vapour
25	81.17	202.5	121.34	0.251	0.644
– 5	– 7.53	236.8	245.2	– 0.042	0.841

   How many tons of ice would a machine working between the same limits and having a relative coefficient of performance of 45% make in 24 hours? The water for ice is supplied at 15°C and the compressor takes 8.2 kg of CO_2/minute. Specific heat of water may be taken as 4.18 kJ/kg °C and latent heat of ice as 335 kJ/kg.

3. (a) Which are the refrigerants preferred for household refrigerator, ice-production plant? Explain.

   (b) What is greenhouse effect? What are the measures to overcome green house effect?

4. (a) Mention the function of each fluid in a three fluid vapor absorption system.

   (b) Write at least five main factors affecting C.O.P of Li-Br absorption system.

5. Explain with the help of a neat sketch, the working of a steam jet refrigeration system.)

6. (a) Define room sensible heat factor. How room sensible heat factor line is drawn on the psychometric chart?

   (b) Explain the procedure to draw a grand sensible heat factor line on a psychrometric chart.

7. An office of 25 people in Mumbai is to be air conditioned when outdoor conditions are 29°C DBT and 73% RH. The required comfort conditions are 21°C DBT and 59% RH with 0.5 m^3/min/person fresh air supply. Air is first cooled, dehumidified and then heated. Calculate the coil capacity, heating coil capacity and capacity of the humidifier.

8. Discuss the conditions of comfort that you would prescribe for an office in a city like Hyderabad where hot and dry climate prevails.