R13

Code No: 126AM

JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY HYDERABAD
B. Tech III Year II Semester Examinations, July/August - 2021
REFRIGERATION AND AIR CONDITIONING
(Mechanical Engineering)

Time: 3 hours **Max. Marks: 75**

Answer any five questions
All questions carry equal marks
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1.a) Explain theoretical vapour compression cycle with dry saturated vapour after compression.

b) 28 tonnes of ice from and at 0^0C is produced per day in an ammonia refrigerator. The temperature range in the compressor is from 25^0C to -15^0C. The vapour is dry and saturated at the end of the compression and an expansion valve is used. There is no liquid sub cooling. Assuming actual COP of 62% of the theoretical, calculate the power required to drive the compressor. Following properties of ammonia are: [7+8]

Temp. 0^0C	Enthalpy (kJ/kg)		Entropy (kJ/kg.K)	
	Liquid	Vapour	Liquid	Vapour
25	298.9	1465.84	1.1242	5.0391
-15^0	112.34	1426.54	0.4572	5.5490

Take latent heat of ice = 335 kJ/kg.

2.a) State various evaporators used in vapor compression refrigeration system.

b) Differentiate between low-side float valve and high-side float valve. [10+5]

3.a) Explain with neat sketch working of Electrolux Refrigerator also explain significance of Hydrogen used in system.

b) A vapour absorption refrigeration system is designed to work with NH_3-H_2 solution is working fluid. The condenser temperature evaporator temperature and generator temperature are 25^0C, 8^0C and 75^0C respectively. Then calculate the maximum possible COP of the system. [7+8]

4.a) Briefly explain construction and working of Practical vapour absorption refrigeration system.

b) Derive an equation of COP for Bell-Coleman Air-refrigerator show different processes on P-V and T-S Diagram. [7+8]

5.a) State and explain factors which govern mean effective temperature.

b) The following data were collected for designing the air-conditioning system of a small auditorium: Total Seating Capacity: 400, Out-door conditions: 35^0C DBT and 76% R.H., Required comfort conditions: 200C DBT and 53% R.H., Sensible heat given out per person: 300 kJ/hr, Latent heat given out per person: 100 kJ/hr, other sensible heat load: 150,000 kJ/hr, Latent heat load of infiltration: 1,00,000 kJ/hr, Quantity of fresh air supplied: 28 m^3/hr/person, desirable temperature rise of conditioned air within the theatre 9^0C. Calculate: (i) Percentage of total air recirculated and bypassed (ii) Volume capacity of the fan. Assume that air leaves dehumidifying coil with 100% R.H. [7+8]