R09

Code No: 58120

JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY HYDERABAD
B. Tech IV Year II Semester Examinations, May - 2017
REFRIGERATION AND AIR CONDITIONING
(Mining Machinery)

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

Answer any Five Questions
All Questions Carry Equal Marks
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1.a) What are the advantages and limitations of air refrigeration system in comparison with vapour compression refrigeration system? Explain.
b) A cooler pressure of 12 bar and refrigerator pressure of 1.8 bar are used in an air refrigeration system with temperature of air leaving the cooler is 30^0C and air leaving the room is 4^0C. Calculate the TR, power required per TR, Expander displacement if compressor displacement is 36 m^3 / min. [7+8]

2.a) How the different operating parameters influence the performance of Vapour compression refrigeration system.
b) An ammonia refrigeration plant operates between a condenser temperature of 40^0C and an evaporator temperature of -10^0C. The vapour is dry at the end of end of compression. The specific heat of ammonia is 2.187 kJ/kg K. Calculate net refrigeration effect, work required and COP. [7+8]

3.a) Compare the capillary tube with the other expansion devices used in vapour compression refrigeration system.
b) Explain the desirable characteristics for the better refrigerants used for vapour compression refrigeration system. [8+7]

4.a) With the help of a neat diagram, explain the working details of Electrolux Refrigerator.
b) Draw the diagram of Li Br vapour absorption refrigeration system and explain the salient features. [7+8]

5.a) Differentiate between pulsejet refrigeration and vortex tube refrigeration system and discuss the salient features of each one.
b) A steam jet refrigeration installation is to deliver chilled water at the rate of 2300 kg/min at 8^0C from supply water at 18^0C. Condenser saturation temperature is 38^0C, nozzle efficiency is 90%, entrainment efficiency is 68% and diffuser efficiency is 78%. Quality of flashed vapor is 0.97. The steam consumption for the motive jet is 6500 kg/hour. Estimate the pressure of the dry and saturated motive steam. [7+8]

6.a) What is the method adopted to develop a psychometric chart? And discuss the importance of psychometric chart in understanding the design of air conditioning systems.

b) An auditorium has to be air conditioned first by cooling and dehumidifying and then heating of summer when the outdoor conditions are 35^0C, 70 % RH. The desired indoor conditions are 20^0C DBT and 60% RH. The cooling coil dew point temperature is 10^0C and the amount of free air to be circulated is 300 cm. Estimate (i) the capacity of cooling coil and its bypass factor, (ii) the capacity of the heating coil and its surface temperature when the by pass factor is 0.25 and (iii) the mass of water vapour removed. [7+8]

7.a) For a bank for 150 persons at 40^0C DBT and 28^0C WBT, inside conditions are 25^0C DBT and 50% RH. The room sensible heat of 75 KW and latent heat of 20 kW, ventilation requirement of 0.6 m^3/min and BPF of 0.2, Calculate effective sensible heat factor, ADP and volume flow rate of dehumidified air.

b) What are the different considerations to be taken into account for the calculations of cooling loads in summer and winter air conditioning systems? Explain. [8+7]

8.a) Explain the working principle of different heat pump circuits used for heating of the system with suitable diagram.

b) What are the equipments required for the dehumidification process? Explain the operational principle. [8+7]

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