R09

Code No: 56018

JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY HYDERABAD
B. Tech III Year II Semester Examinations, May - 2016
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. An aircraft cooling system consists of a compressor, cooler and expansion turbine. The compressor receives air at 1.2 bar and 60^0C from the engine supercharger. It is compressed isentropically with an efficiency of 75% to 1.6 bar and cooled to 55^0C. The air then expands isentropically through the turbine to 0.85 bar, the work developed is used to drive the compressor. The turbine exhaust air is then sent to the aircraft cabin for cooling. Determine
   a) Temperature of air at turbine exhaust and turbine efficiency.
   b) COP of the system. [8+7]

2.a) Draw the refrigeration cycle on T-s diagram when the refrigerant is dry and saturated at the end of compression and find an expression for the COP in terms of i) Temperature and entropies. ii) Enthalpies.

b) A CO_2 refrigerating plant works between the pressure limit of 56 bar and 21 bar. The vapour leaves the compressor at 34^0C and there is no under cooling in the condenser. Find theoretical COP of the system. Assume total heat per kg of vapour after leaving the compressor is 230 kJ/kg. [8+7]

3.a) What are the essential properties of good refrigerant?
b) Explain the working of flooded evaporator. What are its advantages? [8+7]

4.a) Explain, with the help of neat sketch, the working principle of Electrolux refrigerator system.

b) A vapour absorption system works with T_g= 360 K, T_a=310 K and T_e= 260 K. Obtain COP of the system. If the evaporator temperature falls to 255 K, what should be the generator temperature in order to operate the system with the same COP whether energy requirement in the generator will be increased for the given capacity of the refrigeration system? [8+7]

5.a) Explain, with the help of a neat sketch, the working of a steam jet refrigeration system.
b) What are the various applications of thermo-electric refrigerator? [8+7]

6. On a particular day, the atmospheric air was found to have a dry bulb temperature of 30^0C and wet bulb temperature of 18^0C. The barometric pressure was observed to be 756 mm of Hg. Using tables of properties of air, determine relative humidity, specific humidity, the dew point temperature, the enthalpy of dry air and volume of mixture per kg of dry air. [15]

7.a) Define the term "Effective temperature". Describe the factors which affect effective temperature.

b) With the help of a schematic diagram, explain the working of "All fresh Air conditioning system". List out its applications. [8+7]

8.a) Write notes on Grills and Registers.

b) Describe the following types of air filters for cleaning air with simple sketches.
i) Viscous filter
ii) Wet filter.

c) Draw line diagram and explain the working of heat pump. [5+5+5]

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