Roll No ....

AU/ME-8002 (CBGS)

B.E., VIII Semester Examination, June 2020
Choice Based Grading System (CBGS)
Refrigeration and Air Conditioning

Time : Three Hours

Maximum Marks : 70

Note: i)   Attempt any five questions.

      ii)   All questions carry equal marks.

      iii) Use of refrigeration property table and psychometric chart is permitted.

1.   a)   State the limitations due to which it has not been possible to build a Carnot refrigeration system.
   b)   Discuss the working of a reversed brayton cycle used for refrigeration.

2.   A simple saturation cycle using F-12 as refrigerant has been designed to produce 10 tons of ice per day from water at 35°C to ice at –5°C. For effective heat transfer at evaporator and condenser units, a temperature difference of atleast 10°C is required to be maintained. Using p-h chart determine:
   i)   Mass flow of refrigerant
   ii)   Power required to run the plant
   iii) Cylinder dimension assuming length/diameter ratio of 1.0 for a single cylinder, single acting compressor if its tuns 1200 revolution per minute and has a volumetric efficiency of 90%.

   How COP of this system compares with that of Carnot cycle?

   Given: latent heat of ice = 335 kj/kg and

   Specific heat of ice = 1.92 kj/kgK.

3.   a)   Discuss the working of steam jet refrigeration system with neat sketch.
   b)   Explain the ammonia-water absorption system in brief.

4.   a)   A mixture of air and water vapour occupies a volume of 650m³ at 1 bar pressure and 35°C temperature, if its relative humidity is 78%, calculate the specific humidity, the dew point and the masses of air and vapour in the mixture.
   b)   Name any five psychometric processes and represent on psychometric chart.

5.   Determine the sensible heat factor and capacity of a refrigeration system to be installed for abank building to be designed for 100 persons. The pertinent data is stated as

   Outside ambient condition = 40°C dbt and 26°C wbt

   Inside consitions = 22°C dbt and 55% RH

   Building size = 20m × 15m × 5m high

   Number of changes for infiltration load = 2.8 per 24 hours

   Ventilation air = 4.7×10^3 m³/s per person

   Electrical load = 11500 kj/hr

   Latent and sensible heat release per person = 625 kj/hr and 420 kj/hr

   Overall heat transfer coefficient for wall and

   ceiling = 18 kj/m² hr and 10.5 kj/m² hr K

6. a) State and explain various techniques of cooling.
   b) Compare air refrigeration with vapour compression cycle.

7. a) Explain the difference between the vapour compression system and vapour absorption system.
   b) Discuss the different variable involved in the estimation of cooling load for air conditioning.

8. Write a short note of the following:
   a) Sub cooling and super heating
   b) Refrigerant leak detection
   c) Requirement of comfort air conditioning

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