Roll No ....

AU/ME-803 (GS)

B.E. VIII Semester

Examination, May 2018

Grading System (GS)

Refrigeration and Air Conditioning

Time : Three Hours

Maximum Marks : 70

Note: i)   Attempt any five questions out of eight.

ii)   All questions carry equal marks.

iii)   Use of refrigerant property tables and psychrometric chart is permitted in examination.

1.   a)   A reverse carnot cycle has a cop of 4. Determine the temperature ratio of the cycle. If the power consumption of the cycle is 7.5 kW, determine the refrigerating capacity in TR. rgpvonline.com

   b)   Explain the working of a simple aircraft refrigeration cycle with Ram compression.

2.   For a simple aircraft refrigeration system with evaporative cooling, the dates are

   Ram air pressure = 1.05 bar, Room air temp. = 27°C compressed air pressure = 4 bar, pressure drop in heat exchanger 0.2 bar, heat exchanger effectiveness = 0.8, cabin pressure 1 bar, $\eta_t = 0.8$, $\eta_c = 0.83$. Air flow rate through cabin 0.5 kg/sec. Air leaving the cabin = 27°C. Enthalpy change of evaporation cooling fluid = 25 kJ/kg of air flow. Show the cycle on T-S diagram and determine:

   a)   Refrigeration effect

   b)   Ton capacity of refrigeration

   c)   Power required for refrigeration

   d)   COP

   e)   Power supplied to flower

   f)   Amount of air handled by blower of the ram air leaves the heat exchanger at 400 K.

3.   a)   State the advantages of vapour compression refrigeration system over air refrigeration.

   b)   What is Superheating? Why is superheating considered good in certain cases?

4.   An ammonia ice plant operates on simple saturation cycle at the following temperatures condensing temp. 40°C Evaporating temp. = –15°C. It produces 10 tons of ice per day at –5°C from water at 30°C.

   Determine:

   a)   Capacity of refrigeration plant

   b)   Man flow rate of refrigerant

   c)   Isentropic discharge temperature

   d)   Compressor dimensions of volumetric efficiency in 70%. The compressor runs at 1500 rpm. Take   L/D ratio as 1.2

   e)   Theoreticals actual COP.

5.   a)   Explain the working of Electrolux system.

   b)   What do you understand by Eco-friendly refrigerant? Name two ecofriendly refrigerants and state their properties.

6. a) What is evaporative cooling. Explain the process.

b) Air at a condition of 30°C dry bulb and 17°C wet bulb and a barometric pressure of 1050 m bar enters an equipment where it undergoes a process of adiabatic saturation, the air leaving with a moisture content of 5g/kg higher than what it was while entering.

Calculate: **rgpvonline.com**

i) Moisture content of air entering the equipment

ii) Dry bulb temperature and enthalpy of air leaving the equipment.

7. A lab having a unusually large latent heat gain in required to be air conditioned. The design conditions and loads are as follows summer design condition : 40° DBT, 27°C WBT, Inside design condition : 25° DBT, 50% RH Room sensible heat : 34.9 kW, Room latent heat : 18.6 kW

The ventilation air requirement in 85cm.

Determine:

a) Ventilation load

b) Room and effective sensible heat factor

c) Apparatus dew point and amount of reheat

d) Supply air quantity

e) Condition of air entering and leaving coil and supply air temperature

f) Grand total heat assume a suitable bypass factor

8. Write short notes on any two:

a) Steam jet refrigeration

b) Nomenclature of refrigerant

c) Advantages of multi pressure system

d) Comfort conditions

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