SHAHEED BHAGAT SINGH STATE TECHNICAL CAMPUS, FEROZEPUR

ROLL No: | | | | | | | | | | | | | **Total number of pages:[2]**

B.Tech. ME 7th Sem/ 8th Sem

Refrigeration and Air Conditioning

Subject Code: BTME-802 (RP)

Paper ID: M/18

(2011 batch onwards)

Time allowed: 3 Hrs **Max Marks: 60**

Important Instructions:

- **All questions are compulsory.**
- **Assume any missing data, if any.**
- **Use of psychometric and other relevant charts is allowed.**

PART A (2x 10 marks)

Q. 1. Short-Answer Questions: All COs

(a) What are advantages of vapour refrigeration system over air refrigeration system?

(b) How the performance of simple absorption refrigeration system can be improved?

(c) What do you mean by reversed carnot cycle? What are its limitations?

(d) What is difference between dry and wet compression system?

(e) What is effect of superheating and subcooling on performance of a vapour compression system?

(f) Why there is necssicity of desalting and how it is accomplished in a plant?

(g) What is principle of working of desert cooler and under which conditions it works more effectively and why?

(h) What is the utility of cooling towers?

(i) What are the uses of Electrolux refrigeration system?

(j) What is application of low temperature refrigeration in engineering?

PART B (8×5marks)

Q. 2. A dense air refrigeration machine operates on reversed Brayton cycle and is required for 10 tonnes refrigeration capacity .The cooler pressure is 4.2 bar and refrigerator pressure is 1.4 bar. The air is cooled in the cooler to a temperature of 50°C and the temperature of air at the inlet to the compressor is -20° C. Determine the following for an Ideal cycle: COa

a) COP of the system.
b) Mass of air circulated per minute.
c) Theoretical piston displacement of the compressor
d) Net power per ton of the refrigeration

Take Cp = 1.07 kJ/kg-K (for dense air)

OR

How the vapour compression refrigeration system differs from vapours absorption refrigeration system? Discuss the working principle and basic component of both refrigeration systems with help of neat sketches. How COP of vapour compression and absorption refrigerating plant can be determined? COa

Q. 3. An air refrigerator working on Bell Coleman cycle takes air into the compressor at 1bar and – 5°C.It is compressed to 5 bar and cooled to 25°C at the same pressure. It is further expanded in the expander to 1 bar and discharged to take the cooling load. The isentropic efficiency of the compressor is 85% and isentropic efficiency of expander is 90%. Determine: COb

a) Refrigerating capacity of the system if the air circulation is 40 kg/min.
b) H.P. required to run the compressor
c) C.O.P of the system.

OR

What do you mean by term boot strap? Describe a boot strap air refrigeration system with the help a neat sketch. How will you determine the C.O.P of this system and how you will differentiate it from the boot strap evaporative cooling system? COb

Q. 4. What are the factors which affecting the choice of refrigerants commonly used in the refrigerating plant. How will you classify refrigerants? Differentiate between physical and thermodynamic properties of a refrigerant and enlist few commonly used refrigerants. COc

OR

What are the secondary refrigerants? How secondary refrigerants differs from the Azetrops and zeotrops. Why these are used? What are the environmental aspects and utility of ecofriendly refrigerants? COc

Q. 5. An Auditorium is to be air conditioned for sensible load of 58.15 kW and latent load of 14.55 kW. The inside design conditions are 25°C DBT and 50 % RH and outside design conditions are 40°C DBT and 27°C WBT. The volume of fresh air supplied for ventilation of auditorium is 70 m^3/ min. Determine: COd

a) Total load to be taken by the plant
b) Effective sensible heat factor
c) Apparatus dew point
d) Dehumidified air quantity
e) Condition of air entering and leaving the apparatus in the plant.

Assume the bypass factor of cooling coil as 0.15.

OR

A library hall is to be maintained at 24°C DBT and 50% RH, when ambient conditions are 38°C DBT and 40% RH. The sensible and latent heat gains of the hall are 125000 kJ/hr and 68000 kJ/hr respectively. The volume of ventilation is 65 m^3/min. Determine the following : COd

a) The grand total heat
b) Effective sensible heat factor
c) ADP temperature
d) Dehumidified air quantity

Assume the bypass factor for coil = 0.1

Q. 6. What are basic processes on which air conditioning system are designed for industrial purpose and residential comfort for hot and wet summer conditions. Discuss the processes in detail? COe

OR

What is use of Evaporative condenser in a refrigeration plant? Elaborate its features with the help of a neat sketch. How will you determine the volume of air required to pass through an evaporative condenser. COe