TME-605 241 Printed Pages : 4

Paper Code & Roll No. to be filled in your Answer Book

Roll No. | | | | | | | | | | |

UTU (SEM.-VI) -2015

Semester Examination-2015

REFRIGERATION AND AIR CONDITIONING

Time : 3 Hrs. *Max. Marks : 100*

Attempt any four questions.

1. Attempt at any four questions (5×4=20 Marks)

a) What is 1 TR of refrigeration ?

b) What are different methods of refrigeration.

c) Derive the relation for COP of reverse Carnot cycle.

d) Derive the relation for COP of reverse Brayton cycle.

e) Explain the working of Boot starp air refrigeration cycle and derive relation for COP.

f) Explain the working of Regenerative air refrigeration cycle and derive relation for COP

2. Attempt any four questions : (5×4=20 Marks)

a) Explain the working of actual vapour compression fefrigeration system.

b) Show the effect of suction pressure decrease and discharge pressure increase on vapour compression refrigeration system using P-h diagram.

c) Explain the working of flash gas inter-cooling multi compression refrigeration system.

d) Using P-h diagram give different configuration for multi evaporator system.

e) Why we need multi compression and multi-evaporator refrigeration system over simple vapour compression refrigeration system?

f) What is cascade refrigeration system? Give application.

3. **Attempt at <u>any two</u> questions** (10×2=20 Marks)

a) A refrigerator operating on standard vapour compression cycle has a coefficient of performance of 6.5 and is driven by 50kW compressor. The enthalpies of saturated liquid and saturated vapour refrigerants at the operating condensing temperature of 35°C are 69.55kj/kg and 201.45 kJ/kg respectively. The saturated refrigerant vapour leaving evaporator has an enthalpy of 187.53 kJ/Kg. Find the refrigerant temperature at compressor discharge. The C_p of refrigerant vapour may be taken as 0.6155 kJ/kg°C.

b) The following data refer to a reduced ambient refrigeration system
Ambient pressure=0.8 bar
Pr of ram air=1.1 bar
Temp. of ram air=20°C
Pr at the end of main compressor=3.3 bar
Efficiency of main compressor=80%

Heat exchanger effectiveness=80%
Pr at the exit of the auxiliary turbine=0.8 bar
Efficiency of auxiliary turbine=85%
Temp of air leaving the cabin=25°C
Pr in the cabin=1.013 bar
'Flow rate of air=60kg/min
Find(1) Capacity of cooling system(2) Power required to run system (3) COP of system

c. Explain the working of practival vapourabsorption refrigeration system & derive relation for COP.

4. Attempt any two question : (10×2=20 Marks)

a) Explain the working of Li-Br water vopour absorption system with the help of neat sketch.

b) Classify the refrigerants and give nomenclature of the refrigerants?

c) An ammonia refrigerator works b/w-6.7° and 26.7°C, the vapour being dry at the end of isentropic compression. There is no under-cooling of liquid ammonia and the liquid and is expanded through the throttle valve after leaving the condenser. Sketch the cycle on T-s and p-h diagram and calculate the refrigeration effect per kg of ammonia and the theoretical coefficient of performance of the unit with the help of the properties given below:

Temperature (°C)	Enthalpy kJ/kg		Entropy kJ/kg K	
	Liquid	Vapour	Liquid	Vapour
-6.7	152.18	1437.03	0.6016	5.4308
26.7	307.18	1467.03	1.1515	5.0203

5. Attempt **any two** questions : (10×2=20 Marks)

a) Define the following:

1. specific humidity
2. Degree of saturation
3. Relative humidity
4. Dew point temperature
5. Enthalpy of moist air

b) The atmospheric air at 30°C dry bulb temperature and 75% relative humidity enters a cooling coil at the rate of 200m³/min. The coil dew point temperature is 14° C and the by-pass factor of the coil is 0.1. Determine:

1.) The temperature of air leaving the cooling coil, (2). The capacity of the cooling coil in tonnes of refrigeration'(3). The amount of water vapour removed per minute.

c) Classify compressors and explain the working of reciprocating and rotary compressors.

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