CLASS: BTECH   SEMESTER: VII
BRANCH: MECHANICAL   SESSION: MO/2024

SUBJECT: ME401 REFRIGERATION AND AIRCONDITIONING

TIME: 2 HOURS   FULL MARKS: 25

INSTRUCTIONS:
1. The total marks of the questions are 25.
2. Candidates attempt for all 25 marks.
3. Before attempting the question paper, be sure that you have got the correct question paper.
4. The missing data, if any, may be assumed suitably.
5. Tables/Data hand book/Graph paper etc. to be supplied to the candidates in the examination hall.

			CO	BL

Q1   Argue why Carnot VCRS is not practically possible with the help of T-s diagram.   [5]   CO2   L4

Q2   Explain the construction and working of Regenerative aircraft refrigeration system.   [5]   CO1   L2
Also show the various processes in T-s diagram.

Q3   An aircraft moving with the speed of 200 km/h uses simple gas refrigeration cycle for   [5]   CO1   L3
air conditioning. The ambient pressure and temperature are 0.36 bar and -12 °C
respectively. The pressure ratio of compressor is 5. The heat exchanger effectiveness
is 0.94. The isentropic efficiencies of compressor and expander are 0.82 each. The
cabin pressure and temperatures are 1.05 bar and 27°C respectively. Determine:
(i)The temperatures and pressures at all the points of the cycle,
(ii)The volume flow rates through the compressor inlet and expander outlet for 90
tonnes refrigeration.
take $\gamma=1.4$, R= 0.287kJ/kgK, and c_p=1.005 kJ/kg.

Q4   The food storage requires refrigeration system of 12TR capacity when evaporator   [5]   CO2   L3
temperature is -8°C, and condenser temperature of 30°C. The refrigerant R-12 is
subcooled by 5°C before passing through the throttle valve and vapour is superheated
by 6°C before entering the compressor.
Determine:
  (i)   Mass flow rate of refrigerant
  (ii)   Refrigeration effect per kg and COP
  (iii)   Power required to run the plant.
The properties of the refrigerant R-12 are given below:

Saturation temperature, °C	h_f, kJ/kg	h_g, kJ/kg	$C_{p,L}$, kJ/kg-°C	s_f, kJ/kg-K	s_g, kJ/kg-K	$C_{p,v}$, kJ/kg-°C
25	537.6	1708	0.733	4.612	8.54	1.235
-8	376.3	1675	-	4.03	10.23	-

Q5   With neat sketch explain the working of Multi-evaporator system with single   [5]   CO2   L3
compressor and multiple expansion valves. Draw the p-h plot and show the various
process.

::::::19/09/2024::::::M