25/11

Code No.: ME701PC | R20 | H.T.No. | | | 8 | R | | | | | | |

CMR ENGINEERING COLLEGE: : HYDERABAD
UGC AUTONOMOUS
IV–B.TECH–I–Semester End Examinations (Regular) - November- 2024
REFRIGERATION AND AIR CONDITIONING
(MECH)

[Time: 3 Hours] **[Max. Marks: 70]**

Note: This question paper contains two parts A and B.
Part A is compulsory which carries 20 marks. Answer all questions in Part A.
Part B consists of 5 Units. Answer any one full question from each unit. Each question carries 10 marks and may have a, b, c as sub questions.

PART-A **(20 Marks)**

1. a) Differentiate between heat engine, refrigerator and heat pump with formula. [2M]
   b) What are the merits and demerits in air refrigeration system? [2M]
   c) What are the essential components of the refrigeration plant? [2M]
   d) List the different methods of improving the COP of simple vapour compression system. [2M]
   e) Name some secondary refrigerants. [2M]
   f) What are the classifications of evaporators? [2M]
   g) What is the difference between vapour compression and vapour absorption refrigeration system? [2M]
   h) What is the Seebeck effect and Peltier effect? [2M]
   i) Define the specific humidity and Dew point temperature. [2M]
   j) Mention the factors affecting the comfort air conditioning. [2M]

PART-B **(50 Marks)**

2. Explain the Boot- Strap air cycle Refrigeration system with the help of neat sketch and T-s diagram. [10M]

OR

3. A refrigerator working on Bell-Coleman cycle operates between pressure limits of 1.05 bar and 8.5 bar. Air is drawn from the cold chamber at 10^0C, compressed and, then it is cooled to 30^0C before entering the expansion cylinder. The expansion and compression follows the law $PV^{1.3}$ = Constant. Determine the theoretical C.O.P of the system? [10M]

4. Explain the working principle of simple vapour compression refrigeration system with neat sketch. [10M]

OR

5. A vapour compression refrigerator uses R-12 as refrigerant and the liquid evaporates in the evaporator at -15^{0}C. The temperature of this refrigerant at the delivery from the compressor is 15^{0}C when the vapour is condensed at 10^{0}C. Find the coefficient of performance if the liquid is cooled by 5^{0}C before expansion by throttling. Take specific heat at constant pressure for the superheated vapour as 0.64 kJ/kg K and that for liquid as 0.94 kJ/kg K. The other properties of refrigerant are as follows: [10M]

Temperature (°C)	Specific enthalpy (kJ/kg)		Specific entropy (kJ/kg K)	
	Liquid	Vapour	Liquid	Vapour
-15	22.3	180.88	0.0904	0.7051
10	45.4	191.76	0.175	0.6921

6. What are various types of condensers used in refrigeration system, explain any one with neat sketch. [10M]

OR

7. Mention the chemical formula and the refrigerant number of following refrigerants: (i)Dichlorodifluoro methane,(ii) Dichlorotetrafluoro ethane, (iii) Propylene, (iv) Ethylene and (v) Sulphur dioxide. [10M]

8. Explain the working principle of Lithium bromide vapour absorption refrigeration system with a neat sketch. [10M]

OR

9. Explain the working principle of steam jet refrigeration system with a neat sketch. [10M]

10. Atmospheric air at a dry bulb temperature of 16°C and 25% relative humidity passes through a furnace and then through a humidifier, in such a way that the final dry bulb temperature is 30°C and 50% relative humidity. Find the heat and moisture added to the air. Also determine the sensible heat factor of the process. [10M]

OR

11. What is the need of heat pump in air conditioning systems? Mention the heat pump circuits. [10M]

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