

**5TH SEM./DIP.IN MECH./MECH(MAIN)/ MECH(PROD.) /MECH(SAND.)
/MECHANICAL/ MECH(IND.INT.) /2023(W) NEW**

Th-5 Refrigeration And Air Conditioning

Full Marks: 80

Time- 3 Hrs

**Answer any five Questions including Q No.1& 2
Figures in the right hand margin indicates marks**

1. Answer **All** questions 2 x 10
 - a. Define the COP of a refrigerator.
 - b. Explain closed air refrigeration cycle.
 - c. What is the difference open & closed air refrigeration cycle?
 - d. Define vapour absorption refrigeration system.
 - e. What is the use of analyser?
 - f. Write the function of expansion valve with two examples.
 - g. What is humidity ratio?
 - h. Write the conditions of comfort air conditioning.
 - i. What is the chemical formula of refrigerant dichloro-difluoro methane?
 - j. Draw the schematic diagram of bell-coleman cycle.

2. Answer **Any Six** Questions 6 x 5
 - a. Describe actual vapour compression with P-h & T-s diagram.
 - b. Compare between VCRS & VARS system.
 - c. A bell coleman refrigerator operates between pressure limits 1 bar and 8 bar. Air is drawn from the cold chamber at 9°, compressed and then it is cooled to 29° before entering the expansion cylinder. Expansion and compression follows $PV^{1.35} = \text{constant}$. Calculate COP (theoretical). Take $\gamma=1.4$, $C_p=1.003 \text{ kJ/kgK}$
 - d. Describe winter air conditioning.
 - e. Explain the working of single acting reciprocating air compressor with neat sketch.
 - f. State the factors considered for selection of an ideal refrigerant.
 - g. Differentiate between summer air conditioning and winter air conditioning.

Answer Any **Three** Questions

3. The temperature limits of ammonia refrigerant system are 25°C and -10°C. If the gas is dry at the end of compression, calculate COP of the cycle assuming no undercooling of the liquid ammonia. 10

temp	Liquid heat(H_f)	Latent heat	Entropy of liquid
25	298.9	1166.94	1.1242
-10	135.37	1297.68	.5443

- 4 A refrigerating system operates on the reserved carnot cycle. The higher 10
temperature of refrigerant in the system is 35°C and the lower temperature is -15°C .
The capacity is to be 12 tonnes. Determine C.O.P, heat rejected from the system per
hour and power required.
- 5 Explain simple vapour absorption refrigeration system with neat sketch. 10
- 6 Write short notes on 10
- i) Automatic expansion valve
 - ii) Cold storage plant
- 7 What is psychometric chart? Explain different types of Psychometric process. 10