

**BACHELOR OF TECHNOLOGY (C.B.C.S.) (2014 COURSE)**  
**B.Tech.Sem - VI MECHANICAL : WINTER- 2022**  
**SUBJECT : REFRIGERATION & AIR CONDITIONING**

Day : Monday  
 Date : 28-11-2022

**W-13452-2022**

Time : 10:00 AM-01:00 PM  
 Max. Marks : 60

**N.B.:**

- 1) All questions are **COMPULSORY**.
- 2) Figures to the right indicate **FULL** marks.
- 3) Assume suitable data if necessary.

- Q.1** Explain the term “Tonnes of Refrigeration”. A refrigerating system working on Bell-Coleman cycle receives air from cold chamber at  $-4^{\circ}\text{C}$  and compresses it from 1 bar to 4.0 bar. The compressed air is then cooled to a temperature of  $35^{\circ}\text{C}$ , before it is expanded in the expander. Calculate the cop of the system when compression and expansion are: **[10]**
- a) Isentropic      b) follows the law  $pv^{1.25} = \text{constant}$ .

**OR**

Explain “Vortex Tube” refrigeration system. A Carnot cycle machine operates between the temperature limits of  $47^{\circ}\text{C}$  and  $-30^{\circ}\text{C}$ . Determine the COP when it operates as: i) Refrigerating machine      ii) Heat Engine.

- Q.2** The temperature limits of a refrigerating plant are  $25^{\circ}\text{C}$  and  $-10^{\circ}\text{C}$ . If the gas is dry at the end of compression, calculate the coefficient of performance of the cycle, assuming no undercooling of liquid ammonia. Use the following table for properties: **[10]**

Temperature $^{\circ}\text{C}$	Liquid Heat kJ/kg	Latent Heat (kJ/kg)	Liquid Entropy (kJ/kgK)
25	289	1165	1.12
-10	135	1297	0.54

**OR**

Find the theoretical COP for a  $\text{CO}_2$  machine working between the temperature range of  $25^{\circ}\text{C}$  and  $-5^{\circ}\text{C}$ . The dryness fraction of  $\text{CO}_2$  gas during the suction stroke is 0.6. Following properties of  $\text{CO}_2$  are given below:

Temperature $^{\circ}\text{C}$	Liquid		Vapour		Latent Heat kJ/kg
	Enthalpy kJ/kg	Entropy kJ/kgK	Enthalpy kJ/kgK	Entropy kJ/kgK	
25	164	0.59	282	0.99	117
-5	72	0.28	321	1.21	248

- Q.3** Give the classification of refrigerants. Explain practical vapour absorption system with neat sketch. **[10]**

**OR**

Discuss “ODP” and “GWP”. Differentiate between vapour compression and vapour absorption refrigeration system.

**P.T.O.**

