

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

Day : Friday
 Date : 17-06-2022

S-13452-2022

Time : 02:30 PM-05:30 PM
 Max. Marks : 60

- 1) All questions are **COMPULSORY**.
- 2) Figures to the right indicate **FULL** marks.
- 3) Draw neat and labeled diagram **WHEREVER** necessary.
- 4) Assume suitable data if necessary.

Q.1 Derive the expression for COP of Bell Coleman cycle using P-V and T-S diagrams. (10)

OR

Q.1 Give the classification of air refrigeration systems. The capacity of a refrigerator is 300TR when working between -5°C and 26°C . Determine the mass of ice produced per day from water at 22°C . Also find the power required to drive the Unit. Assume that the cycle operates on reversed Carnot cycle and latent heat of ice is 330KJ/kg. (10)

Q.2 A Vapor compression plant using R-12 operated between 35°C condensing temperature and -5°C evaporating temperature with saturated vapor leaving the evaporator. The plant consists of twin cylinder, single acting compressor with 100mm diameter and 120mm stroke running at 300 rpm. The volumetric efficiency is 85% and the mechanical efficiency is 90%. Assuming isentropic compression determine: i) COP ii) Power required (10)

OR

Q.2 An ammonia produces 30 tonnes of ice from and at 0°C in 24 hours. The temperature range of the compressor is from 25°C to -15°C . The vapor is dry saturated at the end of the compression and an expansion valve is used. Assume a coefficient of performance to be 60% of the theoretical value. Calculate the power required to drive the compressor. Latent heat of ice is 335 KJ/kg properties of ammonia are as, (10)

Temperature $^{\circ}\text{C}$	Enthalpy (KJ/Kg)		Entropy (KJ/KgK)	
	Liquid	Vapor	Liquid	Vapor
25	298	1465	1.12	5.03
-15	112	1426	0.45	5.54

Q.3 Give few physical properties of refrigerants. Explain Electrolux refrigeration system. (10)

OR

Q.3 Explain Li-Br vapor absorption refrigeration system with block diagram. (10)

Q.4 Explain By pass factor. The air at 35°C dry bulb temperature and 25°C wet bulb temperature is passed through a cooling coil at the rate of $280\text{m}^3/\text{min}$. The air leaves the cooling coil at 26.5°C dry bulb temperature and 50% relative humidity find: i) Capacity of the cooling coil in tones of refrigeration ii) Wet bulb temperature of air leaving the coil (10)

OR

Q.4 Explain "Air Washer" with neat sketch. The moist air exists at a total pressure of 1.013 bar and 25°C dry bulb temperature. If the degree of saturation is 50% determine the following using steam tables (10)

- i) Specific humidity
- ii) Dew point temperature

Q.5 Give the classification of air conditioning systems. Explain all round air conditioning system with sketch. (10)

OR

Q.5 Give the classification of evaporators explain cooling tower with neat sketch. (10)

Q.6 Discuss mobile refrigeration systems used for food preservations. Draw sketch of ice- plant. (10)

OR

Q.6 Explain different losses in Ducts. Describe static regain method of duct design. (10)