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

Day : Monday
Time : 10:00 AM-01:00 PM

Date : 28-11-2022
W-13452-2022
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 -4^0C and compresses it from 1 bar to 4.0 bar. The compressed air is then cooled to a temperature of 35^0C, 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 $pv^{1.25}$ = constant.

OR

Explain "Vortex Tube" refrigeration system. A Carnot cycle machine operates between the temperature limits of 47^0C and -30^0C. Determine the COP when it operates as: **i)** Refrigerating machine **ii)** Heat Engine.

Q.2 The temperature limits of a refrigerating plant are25^0C and -10^0C. 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 0^0C	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 CO_2 machine working between the temperature range of 25^0C and -5^0C. The dryness fraction of CO_2 gas during the suction stroke is 0.6. Following properties of CO_2 are given below:

Temperature 0^0C	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.

Q.4 Discuss the following psychromatic processes with diagrams: **[10]**

a) Humidification
b) Chemical dehumidification
c) Sensible Heating
d) Mixing of two air streams.

The readings from the sling psychrometer are as,
DBT = 30^{0}C, WBT = 18^{0}C, Barometric pressure = 760 mm of Hg. Calculate following:

i) Dew point temperature
ii) Relative humidity
iii) Specific humidity

OR

Explain the following:

a) Relative humidity
b) Degree of saturation
c) Dry Bulb Temperature
d) Vapour density

In a heating application moist air enters a steam heating coil at 10^{0}C, 50% RH and leaves at 30^{0}C. Determine the sensible heat transfer, if mass flow rate of air is 100 kg of dry air per second.

Q.5 Give the classification of compressors used in refrigeration field. Discuss year round air conditioning system with neat sketch. **[10]**

OR

Give the classification of evaporators used in refrigeration field. Explain draw neat sketch of central air conditioning system.

Q.6 Give the classification of ducts. Explain mobile refrigerators and air conditioners with sketch. **[10]**

OR

Discuss different losses in ducts. Explain cold storage plant with sketch.

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