GALGOTIAS UNIVERSITY

ADMISSION NUMBER												

School of Engineering

B.TECH Mechanical Engineering
Mid Term Examination - May 2024

Duration : 90 Minutes
Max Marks : 50

Sem VI - G3UB601B - Refrigeration and Air Conditioning

General Instructions
Answer to the specific question asked
Draw neat, labelled diagrams wherever necessary
Approved data hand books are allowed subject to verification by the Invigilator

1)	Explain the principle of refrigeration?	K2	(2)
2)	Name some secondary refrigerants	K1	(3)
3)	Explain the working principle of simple vapour compression refrigeration system.	K2	(4)
4)	Explain the concept of greenhouse effect?	K2	(6)
5)	Describe the working principle and basiccomponents steam jet refrigeration system	K3	(6)
6)	In a steam jet refrigeration plant, steam enters the thermocompressor at 0.01 bar and with dryness fraction of 0.09, make up water enters the flashchamber at 18 °C. Determine i)Quality of steam leaving the flash chamber. ii)COP of the plant based on heat input from motive steam .Make use of follwing data isentropic efficiency n of turbine =90%: Nozzle efficiency=90%: Entrainment efficiency=65%: Thermocompressure efficiency= 65%	K3	(9)
7)	The temperature limits of an ammonia refrigerating system operating on simple vapor compression cycle are 25 °C and -10 °C respectively. If the gas is dry at the end of compression, calculate the C.O.P of the system, assuming no under cooling of the liquid ammonia. Use the following table for the properties of ammonia.	K4	(8)

Temperature (^{0}C)	Liquid heat (kJ/kg)	Latent heat (kJ/kg)	Liquid entropy (kJ/kg-K)
25	298.9	1166.94	1.1242
–10	135.37	1297.58	0.5443

8) A simple saturation cycle using F12 is designed for taking a load of 10 tons. The refrigerator and ambient temperatures are -10 °C and 30 °C respectively. Aminimum temperature difference of 5 °C is required in evaporator and condenser for heat transfer. Find: i) mass flow rate through the system, ii) power required in kw.iii) cylinder dimensions assuming L/D = 1.2 for single cylinder, single acting compressor if it runs at 300 r.p.m. with volumetric efficiency = 0.9. K4 (12)

OR

A refrigerator works between -7°C and 27°C the vapour is dry at the end of adiabatic compression. Assuming there is no under cooling determine (i) cop (ii) power of the compressor to remove a heat load of 12140 KJ/hr.The properties of refrigerant are given K4 (12)

T(°C)	sensible Heat (h_f)	Latent heat(h_{fg}) KJ/Kgk)	Entropy of liquid (KJ/Kgk)	Entropy of vapourSg (KJ/Kgk)
-7	-29.3	1297.9	-0.109	4.748
27	1117.23	1172.3	0.427	4.333