Enrolment No./Seat No_____

GUJARAT TECHNOLOGICAL UNIVERSITY

BE- SEMESTER–VII (NEW) EXAMINATION – WINTER 2024

Subject Code:3171918 Date:27-11-2024

Subject Name: Refrigeration and Air conditioning

Time:10:30 AM TO 01:00 PM Total Marks:70

Instructions:

1. **Attempt all questions.**
2. **Make suitable assumptions wherever necessary.**
3. **Figures to the right indicate full marks.**
4. **Simple and non-programmable scientific calculators are allowed.**
5. **Use of Gas, Steam and Refrigerant table and chart is permitted.**

			Marks
Q.1	**(a)**	State different heat loads for Aircraft refrigeration.	**03**
	(b)	Describe future industrial refrigerants with applications.	**04**
	(c)	Explain Cascade refrigeration system with neat diagram. Also state its applications.	**07**
Q.2	**(a)**	Explain the function of sub-cooler and flash chamber.	**03**
	(b)	Explain Screw and Scroll compressors used in refrigeration and air-conditioning with their applications.	**04**
	(c)	A reduced ambient air refrigeration system is use to take 10 TR load of an aircraft cabin. The ram air at 1.2 bar and 15ºC is supplied to cooling turbine-I in which it expands to 0.9 bar. Then this air is delivered to heat exchanger for cooling the air bled off from the main compressor at 3.5 bar. The cooling air from the heat exchanger at 56ºC is expanded upto 0.98 bar in the cooling turbine-II and discharged into air cabin to be cooled. The cabin is to be maintained at a temperature of 22ºC. Find (a) Mass flow rate of cabin air (b) Cooling capacity of heat exchanger. (c) Mass flow rate of ram air (d) COP of the system Assume that the temperature rise in heat exchanger for ram air is not exceeding 36K.	**07**
		OR	
	(c)	Explain multi-evaporator system at different temperatures with multiple expansion valve and back pressure valves with neat diagram and p-h diagram.	**07**
Q.3	**(a)**	Explain concept of Instantaneous heat gain (IHG) and Instantaneous cooling load (ICL).	**03**
	(b)	What is air infiltration? Explain any one method to find the air infiltration through windows and door cracks.	**04**
	(c)	Explain Regenerative Air refrigeration system with neat diagram and derive its COP.	**07**
		OR	
Q.3	**(a)**	Write comparison of VCR and VAR systems.	**03**
	(b)	Explain flywheel effect of building material in cooling load calculation.	**04**
	(c)	Describe LiBr-H_2O absorption refrigeration system with neat diagram.	**07**
Q.4	**(a)**	Define : Outlet, Throw, Drop related to air distribution	**03**
	(b)	Explain different pressure losses in ducts.	**04**
	(c)	State different duct design methods. Explain equal friction method of duct design.	**07**

OR

Q.4	**(a)**	Define Human Comfort and list the factors affecting it.	**03**
	(b)	Explain economic factors influencing duct layout.	**04**
	(c)	Explain the process of cooling load calculation for the drawing hall of your home. Specify size and location of room. What capacity Air conditioner will you buy for it?	**07**
Q.5	**(a)**	List the air-conditioning system components.	**03**
	(b)	Explain different sources of heat gain in an enclosed space.	**04**
	(c)	Write a short note on Effective temperature, comfort chart and its uses.	**07**

OR

Q.5	**(a)**	What is the function of duct? Give classification of ducts.	**03**
	(b)	Differentiate between Split air-conditioning and Package air-conditioning system.	**04**
	(c)	Explain Air-water system of air-conditioning with neat diagram.	**07**

****