Enrolment No./Seat No_____

GUJARAT TECHNOLOGICAL UNIVERSITY

BE - SEMESTER–VII EXAMINATION – SUMMER 2025

Subject Code:3171918 Date:14-05-2025

Subject Name:Refrigeration and Air conditioning

Time:02:30 PM TO 05:00 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.**

			MARKS
Q.1	**(a)**	State important applications of refrigeration system?	**03**
	(b)	Explain ice plant with a neat sketch?	**04**
	(c)	A refrigeration machine using air as working fluid and working on closed Bell Coleman cycle operating under the following conditions: Refrigeration temperature = 150 K, Cooler temperature = 300 K. The air temperature at th entry of the refrigerator is 40 K less than the refrigerator temperature. Pressure in the refrigerator = 1 bar, Calculate 1) Refrigeration effect 2) Net work 3) COP of the machine 4) Cooler temperature. Assume expansion and compression are isentropic	**07**
Q.2	**(a)**	What are desirable characteristics of absorbent and absorbent refrigerant combination in vapour absorption refrigeration cycle?	**03**
	(b)	Draw thermodynamic model of vapour absorption system and Derive equation of COP of ideal vapour absorption system.	**04**
	(c)	State the name of different types of system used for cooling of aircraft cabin. Explain with schematic diagram Bootstrap air Refrigeration system.	**07**
		OR	
	(c)	Explain working of Li-Br vapour absorption refrigeration system with neat sketch.	**07**
Q.3	**(a)**	Write a short note on infiltration?	**03**
	(b)	Discuss thermodynamic and physical properties of ideal refrigerant.	**04**
	(c)	Mention the limitations of Simple vapour compression refrigeration Cycle. Explain compound compression with flash chamber but without intercooler with system diagram and P-H diagram.	**07**
		OR	
Q.3	**(a)**	Categorize different types of loads acting in restaurants.	**03**
	(b)	State different types of compressors used in refrigerators. Also explain flooded type evaporator with a neat sketch?	**04**

	(c)	State the name of Different type's evaporative devices used in refrigeration system Explain Thermostatic expansion valve.	**07**
Q.4	**(a)**	Define volumetric efficiency, isothermal efficiency, and adiabatic efficiency of compressor.	**03**
	(b)	Define human comfort and explain any four factors which affect it?	**04**
	(c)	The main air supply duct of an air conditioning system is 880 mm x 660 mm in cross section, and carries 330 m^3/min of standard air. It branches into two ducts of cross section 660 mm x 550 mm and 660 mm x 440 mm. If the mean velocity in the larger branch is 420 m/s, determine the following: (1) Mean velocity in the main duct and the smaller branch (2) Mean velocity pressure in each duct.	**07**
		OR	
Q.4	**(a)**	Define specific humidity, dew point temperature and wet bulb depression.	**03**
	(b)	Explain importance of site survey for load calculation.	**04**
	(c)	What is effective temperature? What factors affect effective temperature and explain its significance in design of air-conditioning systems	**07**
Q.5	**(a)**	Note down the factors affecting solar heat gain through wall.	**03**
	(b)	Explain equal friction method of duct sizing for air conditioning?	**04**
	(c)	With line diagram explain Central Air-conditioning system of any multi storey building.	**07**
		OR	
Q.5	**(a)**	Write a short note on filters.	**03**
	(b)	Explain following terms with respect to fan i) Total fan pressure ii) Dynamic pressure	**04**
	(c)	What are different methods used for design of the ducts and explain advantages of each over other	**07**

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