Seat No.: _____ *Enrolment No._____*

GUJARAT TECHNOLOGICAL UNIVERSITY

M. E. - SEMESTER – I • EXAMINATION – SUMMER • 2014

Subject code: 712102N **Date: 17-06-2014**

Subject Name: Advanced Refrigeration

Time: 02:30 pm - 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.**

Q.1	**(a)**	Discuss the role of refrigerant in refrigeration. Write down salient characteristics of refrigerants.	**07**
	(b)	Explain in brief óOverview of Advanced refrigeration systems.ô	**07**
Q.2	**(a)**	What do you mean by Thomson effect and Peltier effect? Briefly discuss Thermoelectric refrigerator.	**07**
	(b)	Describe Steam jet refrigeration system. Also write the advantages and limitations of this system.	**07**
		OR	
	(b)	Explain Cascade refrigeration system with a neat diagram.	**07**
Q.3	**(a)**	With schematic and T-s diagram explain the working of Bootstrap air craft refrigeration cycle with ram compression.	**07**
	(b)	What is cold storage? Discuss the various components of cooling load for a cold storage unit.	**07**
		OR	
Q.3	**(a)**	Explain the balancing of compressor and capillary tube in VCR system and effects of unbalanced conditions in compressor-capillary tube system.	**07**
	(b)	A two stage compression ammonia refrigeration system operates between overall pressure limits of 14 bar and 2 bar. The temperature of the desuperheated vapour and subcooled liquid refrigerant are limited to 30^0C. The flash tank separates dry vapour at 5 bar pressure and the liquid refrigerant then expands at 2 bar. Estimate the C.O.P of the machine and power required to drive the compressor, if the mechanical efficiency of the drive is 80% and load on the evaporator is 10TR.	**07**
Q.4	**(a)**	Write note on óDomestic Electrolux refrigerator.ô	**06**
	(b)	Explain single effect LiBr-H_2O vapour absorption system. State its applications.	**08**
		OR	
Q.4	**(a)**	Discuss the use of heat pump for heating and cooling cycle with neat sketch.	**06**
	(b)	Write note on: (1) Various methods of Food freezing (2) Transport refrigeration	**08**
Q.5	**(a)**	A VCR cycle using R134a comprises of one compressor, one condenser and two evaporators of 10 TR and 20 TR capacities. The evaporators are 10^0C and -10^0C respectively. The system comprises multiple expansion valve with back pressure valve. The condenser temperature is 40^0C and liquid is sub cooled by 10^0C in condenser. Assume isentropic compression. Estimate C.O.P. of the system, Compressor power and mass flow rate of cooling medium through each evaporator.	**07**

	(b)	With usual notations derive an expression for COP of an Air refrigeration system working on reverse brayton cycle.	**07**

OR

Q.5	**(a)**	Write Advantages of Absorption refrigeration system over compression refrigeration system.	**06**
	(b)	Write short note on: (1) Balancing of VCR system (2) Primary and Secondary refrigerants.	**08**

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