Seat No.: _____ *Enrolment No._____*

GUJARAT TECHNOLOGICAL UNIVERSITY

M. E. - SEMESTER – I • EXAMINATION – WINTER • 2013

Subject code: 712102N **Date: 26-12-2013**

Subject Name: Advanced Refregeration

Time: 10.30 am – 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. **Use of refrigeration table and chart is allowed.**

Q.1 **(a)** Describe thermodynamic, physical and chemical properties of an Ideal refrigerant. **07**

(b) Discuss suitability of refrigerant for following systems with justification: **07**

1. Fish preservation plant
2. Split air conditioning
3. Hospital air conditioning
4. Central air conditioning

Q.2 **(a)** Briefly explain see beck effects, Thomson effect and peltier effect in connection with thermoelectric refrigeration system. **07**

(b) Sketch and explain a cascade refrigeration system. Draw cascade refrigeration cycle on temperature-entropy and pressure-enthalpy diagrams. **07**

OR

(b) What are the characteristics of good lubricant? Also explain various lubrication methods. **07**

Q.3 **(a)** Draw a neat diagram of "Electrolux refrigerator" and explain its working principle. What is the important role of Hydrogen in this system? **07**

(b) List advantages and limitations of air cycle refrigeration and factors to be considered for selecting refrigeration system for air craft. **07**

OR

Q.3 **(a)** In a 12 tones refrigeration ammonia plant compression is carried out in two stages with water and flash inter cooling and water sub-cooling. Condenser pressure, evaporator pressure and flash inter cooling and sub inter cooling pressures are 12 bar, 3 bar, and 6 bar respectively. If the limiting temperature for inter cooling and sub-cooling is 20° C, determine the following: **07**

a) The coefficient of performance of the plant;
b) The power required for each compressor;
c) The swept volume for each if the volumetric efficiency of each of the compressors is 82%.

(b) Explain steam jet refrigeration system. What are the advantages and limitations of the same? **07**

Q.4 **(a)** Explain with neat sketch and p-h diagram simple saturation cycle with sub cooling of liquid refrigerant by vapour refrigerant. **07**

(b) In an aqua ammonia absorption system the highest and lowest pressure are 16 bar and 3 bar respectively. The concentration of strong solution is 0.4 and degassing range is 0.1 with suitable assumptions find for 10 TR machine the following : **07**

(i) Rate of heat transfer in different elements of the system (ii) Hcop (iii) Energetic efficiency

OR

Q.4	**(a)**	Why a good refrigeration system is required in meat packing plant. What different refrigeration methods are used for meat packing plant?	**07**
	(b)	Write and Explain Industrial application of refrigeration system and Heat Pump.	**07**
Q.5	**(a)**	Explain COP of an Air refrigeration system working on Bell- Coleman cycle.	**07**
	(b)	What are the methods of food freezing? Explain with suitable example.	**07**

OR

Q.5	**(a)**	Describe the balancing of vapour compression refrigeration system with suitable example.	**07**
	(b)	Compare following freezing techniques 1- Air blast and contact freezing 2 -Immersion freezing and cryogenic freezing	**07**

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