Seat No.: _____ **Enrolment No._____**

GUJARAT TECHNOLOGICAL UNIVERSITY

ME Semester –I Examination Feb. - 2012

Subject code: 712102N **Date: 13/02/2012**
Subject Name: Advanced Refrigeration
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.**

Q.1 **(a)** Briefly explain cascade refrigeration system with sketch. **07**

(b) Describe the balancing of vapour compression refrigeration system with suitable example. **07**

Q.2 **(a)** State desired physical, chemical and thermodynamic properties of refrigerants. **07**

(b) Explain in brief which refrigerants would you choose for each of the following applications and why? **07**

i) A cold storage of 100 TR capacities using reciprocating compressor.
ii) An 800 TR air conditioning plan using centrifugal compressor.
iii) A small capacity frozen food cabinet to maintain -30^{0}C temperature.

OR

(b) For NH_3 absorption cycle, we have condenser pressure 14 bar, evaporator pressure 1.4 bar, absorber temperature 36^{0}C and generator temperature 110^{0}C. Find out if such a cycle is possible or not. Change the evaporator pressure to 2.8 bar and check if the cycle is possible now. If leaving evaporator temperature is 5^{0}C, find refrigerating effect and COP. **07**

Q.3 **(a)** Compare vapour compression system with vapour absorption system. **07**

(b) A refrigeration installation using R-134a consists of one compressor, one condenser, and three evaporators of 35KW, 52KW, 70KW. The temperature to be maintained in evaporators is corresponding to pressure of 4 bar 10°C, 2 bar -10°C, and 1 bar -30°C respectively. There is no sub cooling. Calculate mass flow rate in each evaporator, compressor power, COP. Assume condenser pressure of 10 bar. **07**

OR

Q.3 **(a)** Explain Ammonia-Hydrogen refrigerator system. Explain importance of hydrogen in this system. **07**

(b) Explain Individual compressor with compound compression and flash inter cooling. **07**

Q.4 **(a)** Explain steam jet refrigeration system. What are the advantages and limitations of the same? **07**

(b) Explain different effects in thermoelectric refrigeration system. **07**

OR

Q.4	**(a)**	Explain analysis of thermoelectric system and list advantages of thermoelectric refrigeration system.	**07**
	(b)	Explain Industrial application of heat pumps and refrigerant system.	**07**
Q.5	**(a)**	What are the methods of food freezing? Explain with suitable example.	**07**
	(b)	Discuss operational problems faced in transport refrigeration system. State modifications in design of refrigeration system to rectify such problems.	**07**

OR

Q.5	**(a)**	Compare following freezing techniques 1- Air blast and contact freezing 2 -Immersion freezing and cryogenic freezing	**07**
	(b)	Explain characteristics of good lubricant and various Lubrication methods.	**07**

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