Seat No.: _____ *Enrolment No._____*

GUJARAT TECHNOLOGICAL UNIVERSITY

M.E Sem-I Remedial Examination April 2010

Subject code: 711003

Subject Name: Advanced Refrigeration

Date: 08 / 04 / 2010 **Time: 12.00 noon – 02.30 pm**

Total Marks: 60

Instructions:

1. **Attempt all questions.**
2. **Make suitable assumptions wherever necessary.**
3. **Figures to the right indicate full marks.**

Q.1 **(a)** Prove the COP of cascade refrigeration system is shown by **04**

$$\text{COP (Cascade)} = \frac{(\text{COP1} * \text{COP2})}{(1+\text{COP1}+\text{COP2})}$$

where COP1 and COP2 are the co-efficient of performance of LT and HT side respectively

(b) For a cascade refrigeration system operating temperature are 203K and 313K. The refrigerant in LT system is R13 and for HT system is R502. Using Missimer approach get the coupling temperature and the condensing temperature of LT system is 15 ^{o}C above the evaporator temperature in the cascade condenser, compute using refrigerant charts and tables COP of cascade system. Also determine COPs pressure ratios and mass flow rate of refrigerant in both systems. **08**

Q.2 **(a)** Why separation of water vapour from ammonia vapour is necessary? How it is done? Explain separation of water vapour in actual ammonia water absorption refrigeration system with neat sketch. **06**

(b) Explain the mechanism of Ozone layer depletion and the terms ODP & GWP. **06**

OR

(b) How will you find out the volumetric efficiency of a two cylinder reciprocating compressor in your laboratory? **06**

Q.3 **(a)** With a neat sketch describe the principle and working of steam jet refrigeration system which is in your laboratory? **06**

(b) Explain the role of refrigeration in food preservation? How dry ice will help for the process of preserving perishable food? **06**

OR

Q.3 **(a)** What is thermoelectric cooling? How it is developed? Explain what do you understand by FOM? **06**

(b) What is cryogenic freezing? Describe the construction and working of freeze dryer? **06**

Q.4 **(a)** What is walk-in cooler? Describe the working of a mini cold storage plant you are familiar with. **06**

(b) Balancing of compressor and capillary tube for a vapour compression refrigeration system. **06**

OR

Q.4 **(a)** With the help of sketches explain principle and working of Linde system for **06**

air liquefaction.

(b) Explain the difference between compound vapour compression system with flash cooling and flash inter cooling. **06**

Q.5 **(a)** Explain with a neat sketch construction and working of vortex tube refrigeration with its applications. **06**

(b) Inversion curves and their importance for production of low temperature. **06**

OR

Q.5 **(a)** Explain with neat sketch construction and working of pulse tube refrigerator which you come across. **06**

(b) calculate maximum COP of a vapour absorption refrigeration system in which heating, cooling and refrigeration takes place at the temperature of 100 ^{O}C, 20 ^{O}C and -5 ^{O}C respectively. **06**

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