

GUJARAT TECHNOLOGICAL UNIVERSITY
M. E. - SEMESTER – I • EXAMINATION – WINTER • 2013

Subject code: 712102N**Date: 26-12-2013****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.
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 seebeck 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 **07**
- 1- Air blast and contact freezing
- 2 -Immersion freezing and cryogenic freezing
