

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 "Overview of Advanced refrigeration systems." **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°C. 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 "Domestic Electrolux refrigerator." **06**
- (b)** Explain single effect LiBr-H₂O 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°C and -10°C respectively. The system comprises multiple expansion valve with back pressure valve. The condenser temperature is 40°C and liquid is sub cooled by 10°C 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: **08**
- (1) Balancing of VCR system
- (2) Primary and Secondary refrigerants.
