

GUJARAT TECHNOLOGICAL UNIVERSITY**M. E. IST Semester–Remedial Examination – July- 2011****Subject code: 712102N****Subject Name: Advanced Refrigeration****Date: 08/07/2011****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) Describe the balancing of vapour compression refrigeration system with suitable example. **07**
- (b) Describe thermodynamic, physical and chemical properties of an Ideal refrigerant. **07**

- Q.2** (a) Draw and explain two stage compression with water inter cooling. **07**
- (b) Following data refer to a two stage compression ammonia refrigerating system with water inter cooling **07**
- condenser pressure = 14 bar
evaporating pressure = 2 bar
intercooler pressure = 5 bar
load on evaporator = 10 TR
If the temperature of the de-superheated vapour and sub-cooled liquid refrigerant are limited to 30°C, find
1. power required to drive the system
 2. COP of the system

OR

- (b) Briefly explain cascade refrigeration system with sketch. **07**
- Q.3** (a) Explain Ammonia-Hydrogen refrigerator system. Explain importance of hydrogen in this system. **07**
- (b) In an absorption type refrigerator, the heat is supplied to NH₃ generator by condensing steam at 2 kgf/cm² and 90% dry. The temperature in the refrigerator is to be maintained at -5°C find the maximum COP possible. If refrigeration load is 20 tons and actual cop is 70% of the maximum COP. Find the weight of steam required per hour. Take temperature of the atmosphere as 30°C and saturation temperature of steam at pressure of 2 kgf/cm² is 119.62°C **07**

OR

- Q.3** (a) Explain characteristics of good lubricant and various Lubrication methods. **07**
- (b) Compare vapour compression system with vapour absorption system. **07**
- Q.4** (a) Explain steam jet refrigeration system. What are the advantages and limitations of the same? **07**

- (b) A steam jet refrigeration system is supplied with motive steam at 700 kPa dry and saturated. The chilled water temperature is to be 7°C. The make-up water is supplied at 17°C. The condenser operates at 40°C, $\eta_{\text{nozzle}} = 90\%$, $\eta_{\text{entrainment}} = 65\%$, $\eta_{\text{compressor}} = 80\%$. The quality of motive Steam and flashed vapor is 0.92 dry at the beginning of compression. Determine the mass of motive steam required /min/ton. Assume that vapour coming out of the flash chamber is saturated. Also find out the COP of the system. **07**

OR

- Q.4** (a) Explain Industrial application of heat pumps. **07**
(b) Write and Explain Industrial application of refrigeration system. **07**

- Q.5** (a) Explain COP of an Air refrigeration system working on Bell-Coleman cycle. **07**

- (b) An air-cooling system for a jet plane cockpit Operates on the simple cycle. The cockpit is to be maintained at 25°C. The ambient air pressure & temperature are 0.35 bar and -15°C respectively. The pressure ratio of the jet compressor is 3. the plane speed is 1000 km/hr. The pressure drop through the cooler coil is 0.1 bar. The pressure of the air leaving the cooling turbine is 1.06 bar and in the cockpit is 1.01325 bar. The cockpit cooling load is 58.05 kW. Calculate: **07**
(a) Stagnation Temperature & Pressure of air entering the compressor.
(b) Mass flow rate.
(c) COP of the system.

OR

- Q.5** (a) Explain methods for food preservation. Discuss food preservation by refrigeration. **07**
(b) Explain different effects in thermoelectric refrigeration system. **07**
