

GUJARAT TECHNOLOGICAL UNIVERSITY
PDDC - SEMESTER – VII • EXAMINATION – WINTER 2012

Subject code: X 71901**Date: 03/01/2013****Subject Name: Refrigeration and Air-conditioning****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 Chart /Tables and Psychrometric chart is permissible.

Q.1 (a) Define the following:- **07**

- 1) Refrigeration
- 2) Air-conditioning
- 3) Dry bulb temperature
- 4) Wet bulb temperature
- 5) Relative humidity
- 6) Psychrometry
- 7) Specific enthalpy

(b) Explain Boot-strap Air refrigeration system with neat sketch and derive the equation for Power Required and C.O.P. for this refrigeration system. **07**

Q.2 (a) 750 m³/min of recirculated air at 21°C DBT and 11°C Dew point temperature is to be mixed with 250 m³/min of fresh air at 30 °C DBT and 50 % R.H. Determine the Enthalpy, Specific volume , Humidity ratio and Dew point temperature of the mixture. **07**

(b) Classify all the types of Compressors. Discuss in brief about single stationary blade type rotary compressor with neat sketch. **07**

OR

(b) Explain Lithium-Bromide (Li-Br) Vapour Absorption refrigeration system with neat sketch. **07**

Q.3 (a) Explain in detail about 2-stage compression with water intercooler and liquid sub-cooler. Also derive the equation for power required and C.O.P. of the System. **07**

(b) What are the various Advantages and Dis-advantages of Steam Jet Refrigeration System? **07**

OR

Q.3 (a) What are the various Advantages and Limitations of Vapour Absorption refrigeration system over vapour compression Refrigeration System. Draw only the neat sketch of aqua-ammonia vapour absorption refrigeration system. **07**

(b) Define:- Effective Temperature **07**
Discuss in detail about the factors affecting the human comfort.

Q.4 (a) Short note on Year round Air-conditioning system with neat sketch. **07**

(b) What do you mean by duct? Classify the duct. Discuss in brief about Economic considerations in selection of duct. **07**

OR

- Q.4 (a)** A rectangular duct section of 600 mm x 330 mm size carries 80 m³/min of air having density of 1.16 kg/m³. Determine the equivalent diameter of duct if (1) The quantity of air carried in both the case is same (2) The velocity of air in both the case is same. **07**
- (b)** Explain in detail about Fly wheel effect of building material **07**

- Q.5 (a)** Classify the various types of Fans. Also explain in brief about Fan Performance curves with necessary sketch. **07**
- (b)** Short note on Ice-manufacturing Unit. **07**

OR

- Q.5 (a)** Classify the Refrigerants. **07**
What are the various desirable Properties of Refrigerant?
- (b)** R-12 vapour compression refrigeration system has a condensing temperature of 45 °C and evaporating temperature of 0 °C. The refrigerating capacity is 8 tonnes. The liquid leaving the condenser is saturated liquid and compression is isentropic. Determine the following:- **07**
- 1) Refrigerant flow rate
 - 2) Power required to run the compressor.
 - 3) The heat rejected in the plant
 - 4) C.O.P. of the system.

Take the enthalpy at the end of isentropic compression = 220 kJ/kg

The Properties of R-12 refrigerant are

Temp (°C)	Pressure (bar)	h_f (kJ/kg)	h_g (kJ/kg)	s_f (kJ/kg k)	s_g (kJ/kg k)
45	10.846	79.71	204.87	0.2878	0.6811
0	3.086	36.022	187.397	0.1418	0.6960
