Seat No.: _____ Enrolment No._____

GUJARAT TECHNOLOGICAL UNIVERSITY

PDDC - SEMESTER–VII EXAMINATION – SUMMER 2016

Subject Code:X71901 **Date:10/05/2016**

Subject Name: Refrigeration and Air conditioning

Time:02:30 PM to 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.**
4. **Use of refrigeration table and psychometric charts are permitted.**

Q.1	**(a)**	State the principle of Steam jet refrigeration system. Explain the working of Steam jet refrigeration system	**07**
	(b)	Explain with neat sketch and p-h diagram, two evaporators with individual compressor with flash chamber. Derive equation for its COP.	**07**
Q.2	**(a)**	A bell-Coleman refrigerator operates between pressure limits of 1 bar and 8 bar. Air is drawn from the cold chamber at 9 C, compressed and then it is cooled to 29 C before entering the expansion cylinder .Expansion and compression follow the law pv $^{1.35}$. Calculate the theoretical C.O.P. of the system. For air take ý=1.4,Cp=1.003 KJ/KgK.	**07**
	(b)	Classify air conditioning systems. Explain Central air-conditioning system with a neat sketch.	**07**
		OR	
	(b)	An ammonia refrigeration system operates between temperatures limits of -15 C and 30C.The machine circulates 4.5kg/min.These is no undercooling.The temperature after isentropic compression is 75C.Find (a) COP(b)Ice produced in kg/hr from water at 20C and ice at -5C.(c) quality of refrigerant entering the compressor. Take Cpw=4.187KJ/KgK Cpice=2.1 KJ/KgC. Latent heat of ice=336kj/kg Cpg(ammonia gas)=2.82 KJ/KgC	**07**
Q.3	**(a)**	Explain working of thermostatic expansion valve and compare it with capillary tube.	**07**
	(b)	Which factors are to be considered in 'Load Estimation Sheet' for comfort application?	**07**
		OR	
Q.3	**(a)**	Explain the thermodynamic and physical properties of refrigerant.	**07**
	(b)	What is basic principle of Vapour absorption refrigeration system? Write brief note on Electrolux (NH3-H2O) refrigerator.	**07**
Q.4	**(a)**	Define following terms: (i) Saturated air (ii) Specific humidity (iii) Relative humidity (iv) Absolute humidity (v) Dry bulb temperature (vi) Dew point temperature (vii) Wet bulb depression	**07**

	(b)	200 cu-m of air is passed through an adiabatic humidifier per minute. The condition of air at inlet is 40C DBT and15% R.H. and outlet condition is 25 C DBT and 20C WBT.Find the followings: (1)Dew point temperatures (2)Relative humidity of exit Air (3) Amount of water added per minute.	**07**

OR

Q.4	**(a)**	Explain in brief the following **:** **(1)** Filters **(2)** Humidifiers used in air conditioning systems.	**07**
	(b)	A 30 m long rectangular duct 200mmx160mm in size carries standard air at the rate of 24 m^3/min .Assuming the friction factor f=0.0048; determine 1. Total pressure required at the inlet to the duct to maintain this flow and (2) Air power required.	**07**
Q.5	**(a)**	Describe velocity reduction methods of duct design.	**07**
	(b)	State important applications of refrigeration system. Explain construction and working of an Ice plant.	**07**

OR

Q.5	**(a)**	Write note on **:** (a) Shell and tube condenser (b) Screw compressor	**07**
	(b)	Explain Boot-strap air refrigeration system with neat diagram	**07**

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