Enrollment No: _____ Exam Seat No:_____

C.U.SHAH UNIVERSITY

Summer Examination-2018

Subject Name : Refrigeration and Air Conditioning
Subject Code : 4TE07RAC1 Branch: B.Tech (Mechanical)
Semester : 7 Date : 28/03/2018 Time : 10:30 To 1:30 Marks : 70

Instructions:
(1) Use of Programmable calculator & any other electronic instrument is prohibited.
(2) Instructions written on main answer book are strictly to be obeyed.
(3) Draw neat diagrams and figures (if necessary) at right places.
(4) Assume suitable data if needed.

Q-1 Attempt the following questions: (14)

a) For square ducts, the aspect ratio is equal to **01**

(a) Some of longer and shorter side | (b) Difference of longer and shorter side | (c) Product of longer and shorter side | (d) Ratio of longer and shorter side

b) The clearance volume in reciprocating refrigerant compressors _____ the work done and the power required of compressing the refrigerant, **01**

a) does not effect | b) increases | c) decreases | d) none of the above

c) Chemical formula of Methyl-chloride is _____ **01**

a) CH_3Cl | b) CH_2Cl_2 | c) $CClF_3$ | d) None of the above

d) An Electrolux refrigerator is called **01**

(a) Single Fluid Absorption System | (b) Two Fluid Absorption System | (c) Five Fluid Absorption System | (d) None of the above

e) For winter air conditioning, the relative humidity should not be more than **01**

a) 40 % | b) 60% | c) 75 % | d) 90 %

f) The freezing point of R-12 is **01**

a) -86.6 º C | b) -95.2 º C | c) -107.7 º C | d) - 157.5 º C

g) Flooded evaporator has to be fitted with **01**

a) Accumulator | b) Float valve | c) Liquid eliminator | d) All of the above

h) In a domestic vapour compression refrigerator the refrigerant used is **01**

a) CO_2 | b) Freon-12 | c) Ammonia | d) All of the above

i) The sub cooling is a process of cooling the refrigerant in VCRS **01**

a) Before compression | b) After Compression | c) Before throttling | d) After throttling

j) Define Refrigeration effect. **01**

	k)	Give the chemical formula of R-12.	**01**
	l)	Define COP of refrigeration systems.	**01**
	m)	What is the function of Expansion valve?	**01**
	n)	What is the function of Condenser in VCS?	**01**

Attempt any four questions from Q-2 to Q-8

Q-2		**Attempt all questions**	**(14)**
	(a)	Define Refrigeration. State types of refrigeration systems. Explain Bell - Coleman air refrigeration cycle.	**07**
	(b)	Explain the concept of sensible heat factor and bypass factor with suitable sketches	**07**
Q-3		**Attempt all questions**	**(14)**
	(a)	What different methods are used of designing the ducts? Explain the advantage of each over others.	**07**
	(b)	Explain factors affecting human comfort.	**07**
Q-4		**Attempt all questions**	**(14)**
	(a)	An air-refrigerator used for food storage provides 50 tons of refrigeration. The temperature of air entering the compressor is 7 ° C and the temperature before entering into expander is 27 ° C. Assuming 30% more power is required than theoretical, find (a) Actual C.O.P of the cycle, (b) kW-capacity required to run the compressor. The quantity of air circulated in the system is 100 Kg/min. The compression and expansion follow the law $pv^{1.3}$= constant Take γ =1.4 Cp =1kJ/kg°C	
	(b)	Explain simple vapour compression with neat diagram.	**07**
Q-5		**Attempt all questions**	**(14)**
	(a)	What is the effect of sub-cooling on the performance of vapour compression refrigeration system?	**07**
	(b)	5 grams of water vapour per kg of atmospheric air is removed and temperature of air after removing the water vapour becomes 25 ° C DBT. Find the followings : (1) Relative Humidity. (2) Dew – point temperature. Assume condition of atmospheric air is 35 ° C and 60 % R.H., and pressure is 1.013 bar	**07**
Q-6		**Attempt all questions**	**(14)**
	(a)	Explain practical ammonia-water (NH_3-H_2O) vapour absorption system.	**07**
	(b)	Explain the concept of greenhouse effect and global warning	**07**
Q-7		**Attempt all questions**	**(14)**
	(a)	Give the advantages and disadvantages of centrifugal compressor over Reciprocating compressors.	**07**
	(b)	Refrigerating machine working between the temperature limits of -13°C and 37°C and has 90% relative COP. It consumes 4.8 kW power. Determine TR capacity. For same TR capacity, how much power will be consumed by carnot refrigerator? Also for the same power consumption, determine TR capacity of carnot refrigerator operating between same temperature limits.	**07**
Q-8		**Attempt all questions**	**(14)**
	(a)	State the classification of condenser used in refrigeration system	**04**
	(b)	What are the desirable properties of an ideal refrigerant?	**04**
	(c)	Explain with neat sketch the various losses in the duct	**06**