C. U. SHAH UNIVERSITY
Winter Examination-2019

Subject Name: Refrigeration and Air Conditioning

Subject Code: 4TE07RAC1   **Branch: B.Tech (Mechanical)**

Semester : 7   **Date : 20/11/2019**   **Time : 10:30 To 01:30**   **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)	Heat Rejected by the refrigerant during vapour compression refrigeration cycle in	**01**
	(a) Condenser	
	(b) Evaporator	
	(c) Compressor	
	(d) Throttle Valve	
b)	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	
c)	In a domestic vapour compression refrigerator the refrigerant used is	**01**
	(a) CO_2	
	(b) Freon-12	
	(c) Ammonia	
	(d) All of the above	
d)	Flooded evaporator has to be fitted with	**01**
	(a) Accumulator	
	(b) Float valve	
	(c) Liquid eliminator	
	(d) All of the above	
e)	Work of compression of the fluid in vapour absorption system of refrigeration as compared to that in vapour compression refrigeration system is	**01**
	(a) More	
	(b) Less	
	(c) May be more or less	
	(d) Un-predictable	
f)	A machine working on a Carnot cycle operates between 327 K and 270 K. Determine the C.O.P. of a heat pump.	**01**
g)	Define the chemical formula for R-12.	**01**
h)	What is the function of compressor in VCRS?	**01**
i)	What do you mean by Refrigeration effect?	**01**

j) In an All-Air System of central air conditioning   **01**
   (a) The refrigeration plant and air treatment plants may be remotely located in
       central station apparatus
   (b) Cooling medium or heating medium is air and is sent through the ducts and
       distributed into conditioned space through outlet or mixing terminals
   (c) Both (a) and (b) are true
   (d) None of the above is true

k) 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

l) 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

m) What is function of halide torch?   **01**
n) What is pulse tube refrigeration?   **01**

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

Q-2	**Attempt all questions**	**(14)**
a)	Sketch Bell column cycle on P-V and T-S.	**02**
b)	Explain and draw Electrolux refrigeration system.	**06**
c)	State the effects of suction pressure and discharge pressure on performance of vapour compression system	**06**

Q-3	**Attempt all questions**	**(14)**
a)	Explain in brief with a neat sketch a hermetically sealed compressor	**07**
b)	Explain the concept of sensible heat factor and bypass factor with suitable sketches	**07**

Q-4	**Attempt all questions**	**(14)**
a)	Explain actual vapour compression refrigeration cycle with neat diagram.	**07**
b)	A refrigeration system operates on the reversed Carnot cycle. The higher temperature of the refrigerant in the system is 45° C and the lower temp is - 20°C. The capacity is to be 12 TR. Neglect all the losses. Determine:	**07**

1. C.O.P.
2. Heat rejected from the system per hour
3. Power required.

Q-5	**Attempt all questions**	**(14)**
a)	Give the name of different methods to improve simple saturation cycle and explain any one with neat sketch.	**07**
b)	The humidity ratio of atmospheric air at 28 °C dry bulb temperature and 760 mm of Hg is 0.016 Kg per Kg of dry air. Determine:	**07**

1. Partial pressure of water vapour
2. Relative humidity
3. Dew point Temperature
4. Specific enthalpy

5. Vapour Density

Q-6 **Attempt all questions** **(14)**

a) What are desirable characteristics of absorbent in vapour absorption refrigeration cycle? **02**

b) Draw a labeled sketch and explain working of window air conditioning system **06**

c) Explain the thermal exchange mechanism of human body with environment **06**

Q-7 **Attempt all questions** **(14)**

a) What are different methods used for design of the ducts and explain advantages of each over other. **07**

b) A rectangular section 40×40 cm size made of sheet metal is used to carry 100 m^3/min of air having a density of 1.2 kg/m^3. Find the equipment diameter of circular duct if **07**
(a) Quantity carried if same in both the cases,
(b) If the same velocity in both cases if same.
Also find the pressure loss per 100-meter length of duct.
Take f = 0.015 for sheet metal.

Q-8 **Attempt all questions** **(14)**

a) 1. What is sensible heat gain and latent heat gain? **07**
2. List the sources of sensible and latent heat gain in a restaurant?

b) Explain with neat sketch the working principle of boot-strap air refrigeration system with T-S diagram. **07**