

# C.U.SHAH UNIVERSITY

## Summer Examination-2017

**Subject Name: Refrigeration and Air Conditioning**

**Subject Code: 4TE07RAC1**

**Branch: B.Tech (Mechanical)**

**Semester: 7**

**Date: 29/03/2017**

**Time: 02:30 To 05:30 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.
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- 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<sub>2</sub>
    - (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) Define COP of refrigeration systems. (01)**
  - g) What are radial flow fans? (01)**
  - h) What is the function of compressor in VCS? (01)**
  - i) Why is Carnot COP greater than actual COP in VCS? (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)** State Dalton's law of Partial Pressure. **01**
- n)** What is the difference between a refrigerator and a heat pump? **01**

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

- Q-2** **Attempt all questions** **(14)**
- a)** Explain in brief the necessity of Refrigeration and define Refrigeration effect. **04**
- b)** Sketch Bell column cycle on P-V and T-S. List process involved. **04**
- 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 with neat sketch the working of ice-plant? **04**
- b)** State the classification of condenser used in refrigeration system? **04**
- c)** Explain the concept of sensible heat factor and bypass factor with suitable sketches? **06**
- Q-4** **Attempt all questions** **(14)**
- a)** Explain simple vapour compression with neat diagram. **07**
- b)** A cold storage room has walls made of 0.23 m of brick on the outside, 0.08 m of plastic foam and finally 15 mm of wood on the inside. The outside and inside temperature is 22°C and -2°C respectively. If the inside and outside heat transfer coefficient are 29 and 12 W/m<sup>2</sup> °K respectively the thermal conductivities of bricks, foam and wood are 0.98, 0.02 and 0.17 W/m °K respectively. Determine rate of heat removal by refrigeration per unit area of wall. **07**
- Q-5** **Attempt all questions** **(14)**
- a)** 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**
- b)** Explain and draw Electrolux refrigeration system. **07**



