BHARTIYA SKILL DEVELOPMENT UNIVERSITY

Registration No.: .....

School of RAC Skills

Session: 2020-21 (Winter Semester)

B. Voc. 5th Semester

1st Sem. Examination

Course Code: HVA1501 **Time: 1 Hours**

Course Name: Heat Load Estimation **Max. Marks: 20**

Instruction: Attempt all questions

Section – A

05X01 = 05 Marks

1. _____ is the process of mechanically moving air through building through an air handler system to the rooms.

   a) Ventilation b) Purification c) Circulation d) None of the above

2. Each person at rest will give off about____BTUs.
   a) 500
   b) 300
   c) 100
   d) 200

3. Which of the following is not a part of building heat transfer factor –
   a) Floor
   b) Walls
   c) Electrical Boxes
   d) Roof

4. Which of the following is used to seal off moisture:
   a) Air Barrier
   b) Water barrier
   c) Vapor Barrier
   d) None of the above

5. Heat load estimation is done to improve:
   a) Cost
   b)Comfort
   c) Durability
   d)All of the above

Section – B

03X02 = 06 Marks

1. What are sources of internal gain in building?
2. What is Infiltration gain?
3. What is heat transfer factor?

Section – C

03X03 = 09 Marks

1. Why is air movement is important for human comfort?
2. What are some insulation types?
3. What is exfiltration?

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Course Name: Heat Load Estimation **Max. Marks: 20**

Instruction: Attempt all questions

Section – A

05X01 = 05 Marks

1. a
2. b
3. c
4. c
5. d

Section – B

03X02 = 06 Marks

1. The internal gain sources are Humans, Lighting equipment and the appliances which are being used inside the room or building.

2. Infiltration is a process of air entering the building through means of replacing their that was exhaust from the building. Most of the time infiltration comes into the building through cracks through Windows, doors and other means. Infiltration reduces the efficiency of the building because it's uncontrollable when the outdoor temperature is the greatest from the indoor temperature.

3. The heat transfer factor or heat transfer multiplier is a number that is used to determine how a material will resist heat transfer through. The better the resistance the slower he will move through it. Therefore, the smaller the heat transfer multiplier, the better this material will resist heat transfer through it.

Section – C

03X03 = 09 Marks

1. The body needs air movement around it to help aid in evaporation through perspiration. Air movement will accelerate evaporation of the body surface help the body to maintain his core temperature. Without this air movement evaporation will diminish and the body will try to lower the temperature or maintain in other ways. Most humans will fill comfortable whether some air movement around them.

2. Insulation for a home comes in many forms and sizes. Insulation can be fiberglass batts, cellulose, polyurethane foam and many others. What is important, is how it is installed and where it is located. Two things to consider for installation are thermal losses and air bypasses. If either one of these two issues are existent, the insulation becomes inefficient.

Therefore, stopping all air leakage is and having the correct amount of insulation will affect how well a transfer is reduced.

3. Exfiltration occurs when bathroom fans in kitchen fans are running an exhausting the inside air to outside. This increases infiltration and reduces the efficiency of the home. We need to exhaust air from both kitchens and bathrooms because moisture can build up and cause other problems that can affect our health. There must be a happy medium between health and energy by controlling the amount of air being exhausted.

Registration No.: .....

BHARTIYA SKILL DEVELOPMENT UNIVERSITY

School of RAC Skills

V Semester, 1st In-Sem. Examination

B. Voc. Program, Winter Semester (2020-21)

Course Code: HVA1502 Time: 1 Hour

Course Name: Cold Chain & Cold Storage Max. Marks: 20

Instruction:

1. Attempt all Questions.
2. Each question of Section – A carries 01 mark.
3. Each question of Section – B carries 02 mark.
4. Each question of Section – C carries 03 mark.

Section – A

05X01 = 05 Marks

1. Keeping in mind that texture changes take place after harvest, pulpy fruits become extremely hard after harvest.

a. True
b. False
c. Mixed
d. None of the above

2 After harvest, _____ of fruits and vegetables undergoes change.

a. Texture, nutrients, minerals
b. Color, minerals, nutrients
c. Texture, minerals, nutrients
d. None of the mentioned

3 Which of the following is true about fruits and vegetable processing?

a. They get spoil very fast and hence need to be consumed soon
b. They have high moisture content and should be kept in a cold, dark place
c. They're tender and hence get spoiled easily
d. All of the mentioned

4 Which of the following is not related to Post Harvest losses?

a. Postharvest losses can be reduced by adding value to products
b. Packaging, storage, transportation areas are where losses take place
c. Farmers don't earn much after adding value to products
d. Value can be added to products by converting raw form into a more processed/refined form

5. Which of the following are Milk Processing Operations?

a. Clarification
b. Pasteurization
c. Homogenization
d. All of the mentioned

Section – B

03X02 = 06 Marks

1. What is the difference between cold storage and cold chain?
2. What is food preservation?
3. Write down the different types of cold storages.

Section – C

03X03 = 09 Marks

1. Explain post harvest physiology of fruits and vegetables through neat sketch.
2. Write down the pre harvesting factors that affect the product quality.
3. Explain different types of insulation in detail.

Registration No.: .....

BHARTIYA SKILL DEVELOPMENT UNIVERSITY

School of RAC Skills

V Semester, 1st In-Sem. Examination

B. Voc. Program, Winter Semester (2020-21)

ANSWER KEY

Course Code: HVA1502 Time: 1 Hour

Course Name: Cold Chain & Cold Storage Max. Marks: 20

Section – A

05X01 = 05 Marks

1. Keeping in mind that texture changes take place after harvest, pulpy fruits become extremely hard after harvest.

b. False

2 After harvest, _____ of fruits and vegetables undergoes change.

a. Texture, nutrients, minerals

3 Which of the following is true about fruits and vegetable processing?

d. All of the mentioned

4 Which of the following is not related to Post Harvest losses?

c. Farmers don't earn much after adding value to products

5. Which of the following are Milk Processing Operations?

d. All of the mentioned

Section – B

03X02 = 06 Marks

1. What is the difference between cold storage and cold chain?

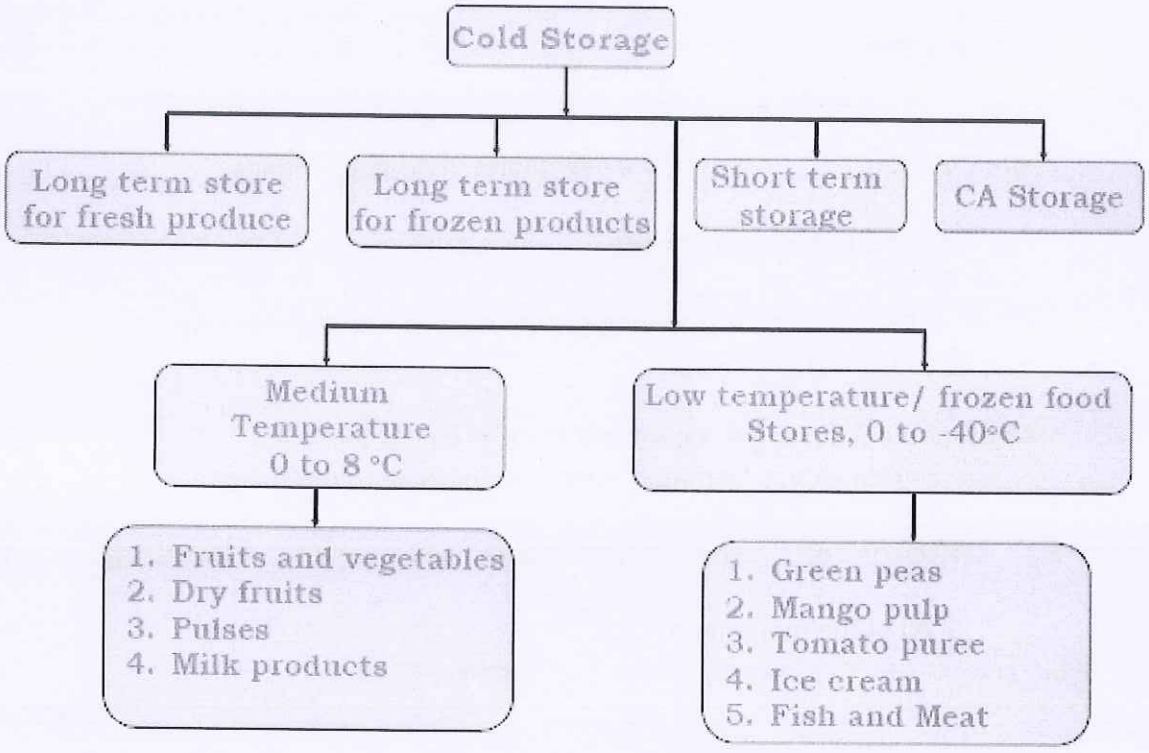
A cold chain warehouse (or cold chain storage) is a specialized structure that's always closed off and insulated from its external environment, and where conditions inside are carefully controlled. Cold chain warehouses (often referred to as ""cold storage"" or ""temperature controlled warehouses"") are used to store perishables that are extremely sensitive and can spoil easily if not stored properly. Transportation in cold chains is carried out in cold boxes or refrigerated containers that accomplish EXACTLY what a cold chain warehouse's facilities do - guarantee that temperature-sensitive goods are maintained in conditions that guarantee their survival, whether in the warehouse or on the road.

A cool store or cold store is a large refrigerated room or building designed for storage of goods in an environment below the outdoor temperature. Products needing refrigeration include fruit, vegetables, seafood and meat. Cold stores are often located near shipping ports used for import/export of produce.

2. What is food preservation?

   Retaining food over a period of time without being contaminated by pathogenic organisms or chemicals and without losing its colour, texture, flavour and nutritious value.

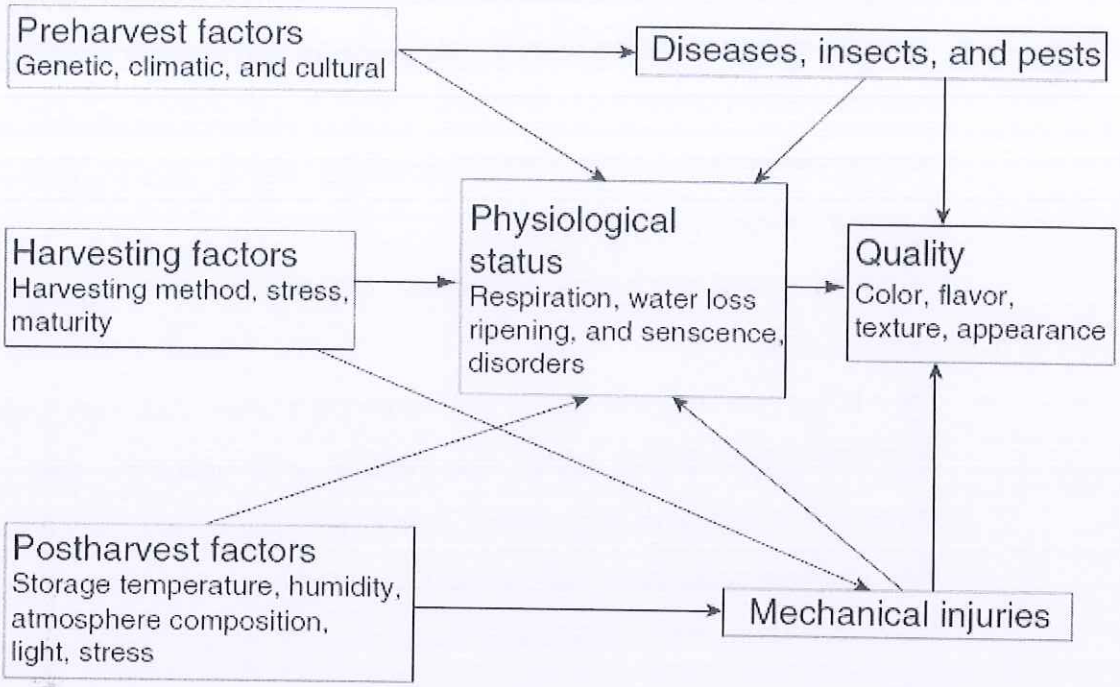
3. Write down the different types of cold storages.



Section – C

03X03 = 09 Marks

1. Explain postharvest physiology of fruits and vegetables through neat sketch.



2. Write down the pre harvesting factors that affect the product quality.

Answer: Genetic

Genetic makeup has a profound effect on the selection of a raw material for a given processing application. Cultivar and rootstock selection influence the composition, quality, storage potential, and response to processing characteristics that may be inherited.

Climatic

The growing region and environmental conditions specific to each region, such as temperature, humidity, light, wind, soil texture, elevation, and rainfall, significantly influence the quality of fruits and vegetables.

Cultural Practices

Soil type, soil nutrient and water supply, pruning, thinning, pest control or chemical spray, and density of planting influence the quality of plant produce.

3. Explain different types of insulation in detail.

Expanded polystyrene

Expanded polystyrene (EPS) is one of the most efficient rigid insulation materials available today and is widely and successfully used throughout the cold store industry.

Extruded polystyrene

Extruded polystyrene is basically manufactured from the same raw material as EPS, with the exception that extruded polystyrene for use in panel production is a foam insulation board without a skin. Other forms of extruded polystyrene are available, incorporating a skin, such as the heavier density used for floor insulation purposes. It is manufactured by a continuous

extruding process which gives a rigid closed cell structure with unique properties.

Polyurethane

Rigid polyurethane (PUR) foams are highly cross-linked polymers with closed cell structures which bubble within the material, with unbroken walls, so that gas movement is retarded. The chlorofluoromethane gas is contained within the walls and, as these substances have a much lower thermal conductivity than air, such closed cell forms have significantly lower thermal conductivity than any open cell foam.

BHARTIYA SKILL DEVELOPMENT UNIVERSITY

Registration No.: .....

School of Refrigeration and Air-conditioning Skills

Session: 2020-21 (Winter Semester)

B. Voc. Program, V Semester,

1st In-Sem. Examination

Course Code: HVA1503 **Time: 1 Hour**

Course Name: Chilled water supply system design **Max. Marks: 20**

Section – A

05*01 = 05 Marks

Note: Each question carries 02 mark.

Q. 1: When a chiller is used, the secondary refrigerant that circulates in the building is

A. Air
B. water
C. barine
D. glycol

Q. 2: A refrigerant compressor is used to

A. raise the pressure of the refrigerant
B. raise the temperature of refrigerant
C. circulate the refrigerant through the system
D. all of the above

Q. 3: The natural convection air-cooled condensers are used in

A. domestic refrigerators
B. water coolers
C. room air conditioners
D. all of these

Q. 4: Which compressors used in chillers typically range from 5 to 50 tons.

A. reciprocating
B. scroll
C. screw
D. centrifugal

Q. 5: The commonly used refrigerant in ice plant is

A. NH_3
B. CO_2
C. R-12
D. none of these

Section – B

03*02 = 06 Marks

Note: Each question carries 02 mark.

Q. 1: Classified the refrigerants with examples.

Q. 2: Classified the HVAC chiller.

Q. 3: What is the difference between a single-stage and two-stage centrifugal compressor?

Section – C

03*03 = 09 Marks

Note: Each question carries 03 mark.

Q. 1: Explain the three loops of water-cooled HVAC system with neat sketch.

Q. 2: Write down the advantages and disadvantages of vapour absorption refrigeration system over vapour compression refrigeration system.

Q. 3: Write down the advantages of water cooled and air-cooled condenser chiller system.

BHARTIYA SKILL DEVELOPMENT UNIVERSITY

Registration No.: .....

School of Refrigeration and Air-conditioning Skills

Session: 2020-21 (Summer Semester)

B. Voc. Program, V Semester,

1st In-Sem. Examination

Course Code: HVA1503 Answer key **Time: 1 Hour**

Course Name: Chilled water supply system design **Max. Marks: 20**

Section – A

05X01 = 05 Marks

05 objective type questions, each question carries 01 mark.

Q. 1: B
Q. 2: D
Q. 3: A
Q. 4: B
Q. 5: A

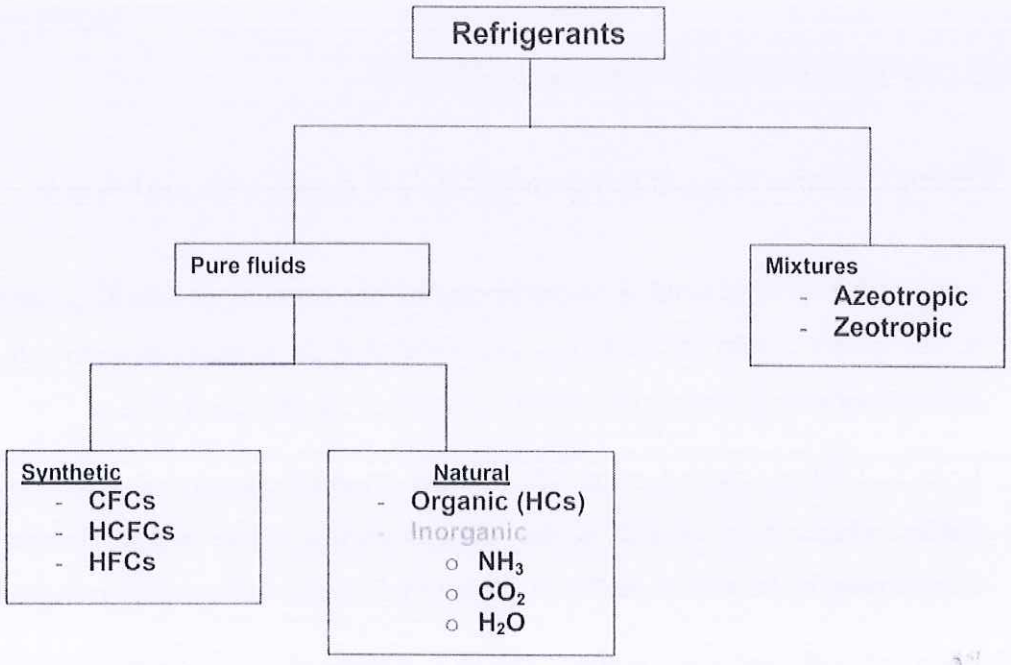
Section – B

03X02 = 06 Marks

3 short answer type questions, each question carries 02 marks.

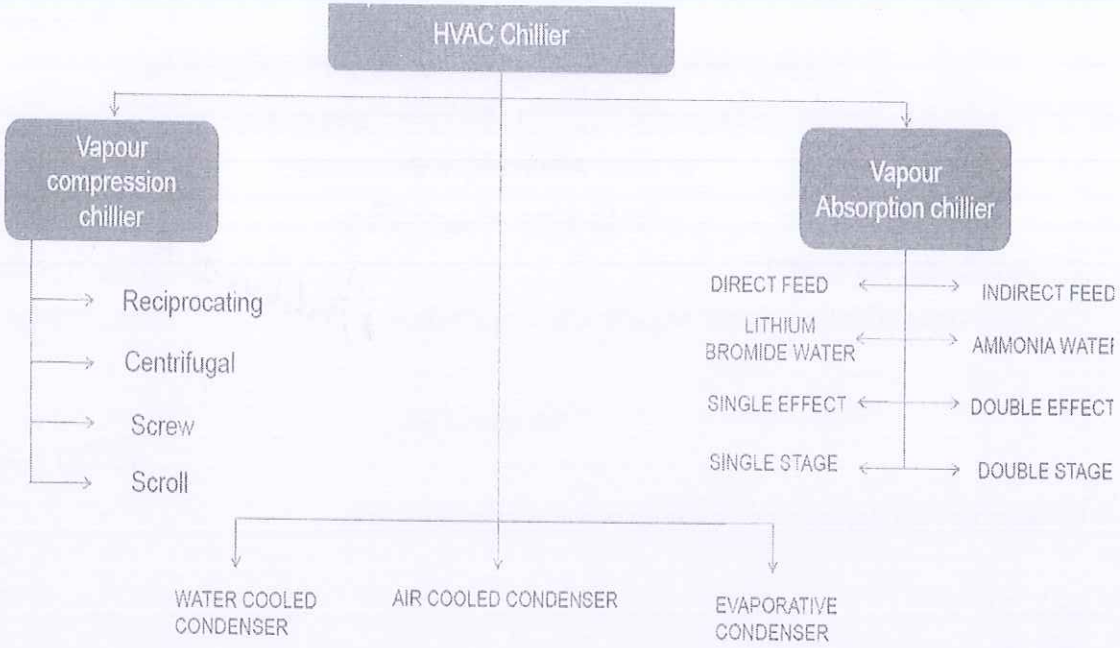
Q. 1: Classified the refrigerants with examples.

Ans.



Q. 2: Classified the HVAC chiller.

Ans.



Q. 3: What is the difference between a single-stage and two-stage centrifugal compressor?

Ans. The main difference between single- and two-stage compressors is the number of times that air gets compressed between the inlet valve and the tool nozzle. In a single-stage compressor, the air is compressed one time; in a two-stage compressor, the air is compressed twice for double the pressure. Two-stage compressors perform less work to compress air to a given pressure, which means operating costs are lower and efficiency gets improved.

Section – C

03X03 = 09 Marks

03 essay type questions, each question carries 03 marks.

Q. 1: Explain the three loops of water-cooled HVAC system with neat sketch.

Ans.

- Loop 1: Air system: Cold air is distributed by one or more air-handling units (AHUs) to the spaces within the building. The distributed air is returned to the air handling unit, mixed with the required quantity of outdoor air for ventilation.
- Loop 2: Chilled water system: The warmer-returned chilled water enters the water chiller where it is cooled to the desired chilled water supply temperature by transferring the heat extracted from the building spaces to a primary refrigerant.
- Loop 3: Condenser water system: The heat of compression must then be added to the heat load on the chilled water loop to establish the amount of heat that must be rejected by the condenser to a heat sink, typically the outdoor air.

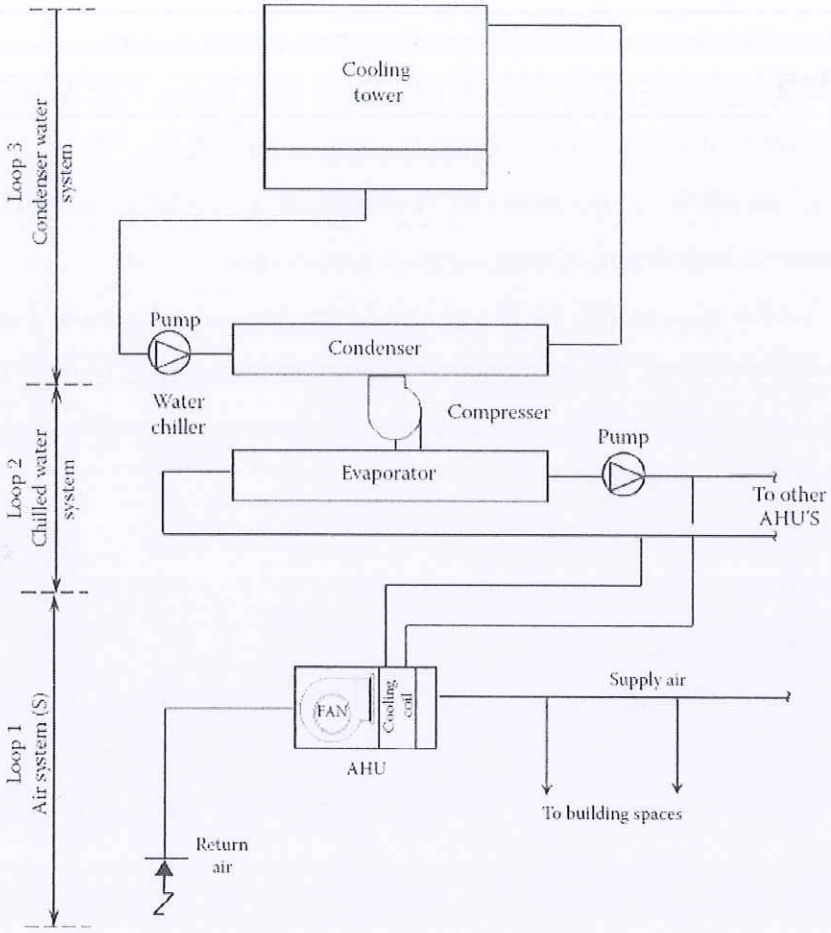


Fig. Water-cooled HVAC system

Q. 2: Write down the advantages and disadvantages of vapour absorption refrigeration system over vapour compression refrigeration system.

Ans.

Advantages of VARS over VCRC

1. In the VARS, the only moving part of the entire system is a pump which has a small motor. Thus, the operation of this system is essentially quiet and is subjected to little wear. The vapour compression system of the same capacity has more wear, tear and noise due to moving parts of the compressor.
2. VARS system uses heat energy to change the condition of refrigerant from the evaporator. The VCRC system uses mechanical energy to change the condition of refrigerant from the refrigerant.
3. The VARS system are usually designed to use steam, either at high pressure or low pressure. The exhaust heat from furnaces and solar energy may also be used. Thus,

this system can be used where the electric power is difficult to obtain or is very expensive.

4. The space requirements and automatic control requirements favor the absorption system more and more as the desired evaporator pressure drops.
5. The VARS system can be built in capacities well above 1000 tons of refrigeration each, which is the largest size for single compressor units.
6. The load variations do not affect the performance of VARS system. The performance of a vapour compression system at partial loads is poor.
7. In the VARS system, the liquid refrigerant leaving the evaporator has no bad effect on the system except that of reducing the refrigerating effect. In the VCRC system, it is essential to superheat the vapour refrigerant leaving the evaporator so that no liquid may enter the compressor.

Disadvantage:

1. Less COP
2. More space required
3. More amount of refrigerant is circulated, which increase the running cost.

Q. 3: Write down the advantages of water cooled and air-cooled condenser chiller system.

Ans.

S. No.	Water cooled chiller	Air-cooled chiller
1	Higher efficiency	Lower installed cost
2	Custom selections on larger sizes	Quicker availability
3	Larger tonnage capabilities	No cooling tower or condenser pump required
4	Indoor chiller location	Less maintenance
5	Longer life	No mechanical room required

BHARTIYA SKILL DEVELOPMENT UNIVERSITY

Registration No.: .....

School of Refrigeration & Air conditioning Skills

Session: 2020-21 (Winter Semester)

B. Voc. Program, V-Semester,

1st In-Sem. Examination

Course Code: HVA1504 **Time: 1 Hour**

Course Name: AC system & Testing **Max. Marks: 20**

Instruction:

1.Use the attached chart for reference.

2.Take given dimensions in Inches or convert them.

Section – A

05X01 = 05 Marks

Q1) What is Nacph

a) Number of air change per hour b) Number of air condensed per hour

c) Number of person cfm per hour d) Number of airs cumulated per hour.

Q2) The condition of refrigerant after passing through the condenser in a vapor compression system is?

a) Saturated liquid b) Wet vapor

c) Dry saturated vapor d) Superheated vapor

Q3) Fire dampers are certified by

a) Under writer's laboratory b) Ashrae

c) Ishrae d) Duct work

Q4) BIS-277 is for _____

a) Sheet Metal Specification b) BIS-655 Sheet Metal Fabrication and Erection

c) Sheet Metal Work Safety Standards. d) Duct work

Q5) In parking we use _____ for Ventilation.

a) Jet motor b) Jet fan

c) dc motor d) exhaust fans

Section – B

03X02 = 06 Marks

Question6) What is ventilation?

Question7) What are the different types of heat?

Question8) Write down the Types of central air conditioners?

Section – C

03X03 = 09 Marks

Q9) Mention the Application of ventilation with at least 3 Examples?

Q10) Why Ventilation in air-conditioning system is required?

Q11) For the above Write about parking ventilation with Their type?

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Registration No.: .....

School of Refrigeration & Air conditioning Skills

Session: 2020-21 (Winter Semester)

B. Voc. Program, V-Semester,

1st In-Sem. Examination

Answer key

Course Code: HVA1504 **Time: 1 Hour**

Course Name: AC system & Testing **Max. Marks: 20**

Instruction:

1.Use the attached chart for reference.

2.Take given dimensions in Inches or convert them.

Section – A

05X01 = 05 Marks

A1.a) Number of air change per hour.

A2.a) Saturated liquid

A3. a) Under writer's laboratory

A4. a) Sheet Metal Specification

A5.b) Jet fan

Section – B

03X02 = 06 Marks

A6) Process of removal of foul air by adding fresh air. In order to maintain I.A.Q

Parking Ventilation For parking area, volume of that area is considered for CFM Methods of Ventilation in Parking, Using Jet Fans, Using Blower in Ducting to maintain the air process

A7) There are basically 2 type of heat as temperature is taken into consideration.

Latent Heat – does not change the temperature of the substance applied. Responsible for phase change.

Here temperature is constant.

Specific Heat- Raises the temperature of substance by a significant amount and responsible for temperature change

A8) Types of air conditioning central are as follows

1. Roof top unit – it's a big window type system in which all components are mounted on roof connected with a Duct to supply for all the building needs
2. Chillers with Water cooling condenser & air-cooled condenser

As a part of system these chillers are design according to building need with all calculation of air distribution side and plumbing demand

3. DX SYSTEM Is also a part of central with individual control but no treatment of air is there so we required and extra Fresh air supply to maintain the oxygen demand.

Section – C

03X03 = 09 Marks

A9) Application of ventilation are

• Kitchen ventilation •

Pantry Area •

Car parking ventilation

• DG Rooms & Electrical Rooms

• Warehouse

• Boiler Area

A10) In order to maintain the required oxygen demand for an occupant. Ventilation is needed since respiration has a byproduct of carbon di oxide in it Which on higher concentration convert into carbon mono oxide.

Which is harmful for Occupant, so ventilation is needed for maintaining oxygen demand.

A11) There are basically 2 type of method to Make parking ventilation.

1 Blowers with duct **2. Duct less System.**

1.Blowers with duct – In this system we calculate the required amount of CFM and design the ducting along with grills and diffuser.

Select the blower capacity and combine the package into 1 duct unit.

2.Duct less system in this a **Jet fan** with arguer shape is taken with in a barrel type assembly for Exchange of air