

**BHARTIYA SKILL DEVELOPMENT UNIVERSITY****School of RAC Skills****III Semester, 1st In-Sem. Examination****B. Voc. Program, Summer Semester (2021-22)**Course Code: ^{RAC} 1301

Time: 1 Hour

Course Name: Psychrometry and System Design

Max. Marks: 20

Instruction:

Attempt all Questions.

Section – A

05X01 = 05 Marks

1. The refrigerant R-717 is:
 - a. Air
 - b. Water
 - c. Ammonia
 - d. Carbon dioxide

2. The ozone friendly refrigerant R-134a contains:
 - a. One Chlorine atom
 - b. Two Chlorine atom
 - c. Four Chlorine atom
 - d. No Chlorine atom

3. Which of the following is an azeotrope refrigerant?
 - a. R-11
 - b. R-40
 - c. R-114
 - d. R-502

4. R-410a is a mixture of:
 - a. R-32/R-125 (40%/60%)
 - b. R-32/R-125 (45%/55%)
 - c. R-32/R-125 (50%/50%)
 - d. R-32/R-125 (48%/52%)

5. What is the refrigerant number for the chemical formula CCl₃F?
 - a. R-12
 - b. R-11
 - c. R-134a
 - d. None

Section – B

03X02 = 06 Marks

1. Why do we use refrigerant in refrigeration system? How it works in the cycle?
2. What does superheating and subcooling means in a p-h chart?
3. What is the meaning of specific heat?

Section – C

03X03 = 09 Marks

1. Explain the nomenclature of R-22.



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2. Write down the basic properties of an ideal refrigerant.
3. Describe the classification of refrigerant.

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**BHARTIYA SKILL DEVELOPMENT UNIVERSITY****School of RAC Skills****ANSWER SHEET**III Semester, 1st In-Sem. Examination

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Section – A

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1. The refrigerant R-717 is:
c. Ammonia
2. The ozone friendly refrigerant R-134a contains:
d. No Chlorine atom
3. Which of the following is an azeotrope refrigerant?
d. R-502
4. R-410a is a mixture of:
c. R-32/R-125 (50%/50%)
5. What is the refrigerant number for the chemical formula CCL_3F ?
b. R-11

Section – B

03X02 = 06 Marks

1. Refrigerant- A heat carrier substance.
For working – It undergoes phase changes at suitable pressure and temperature.
2. Degree of superheat= Actual measured temperature of vapor/steam- Saturated temperature of vapor/steam.
Degree of sub-cool= Saturated liquid temperature – Actual measured temperature.

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3. The specific heat capacity of a substance is the heat capacity of a sample of the substance divided by the mass of the sample. Specific heat is also sometimes referred to as massic heat capacity.

Section – C

03X03 = 09 Marks

1. R 22

$X = 0 \Rightarrow$ No. of Carbon atoms = $0 + 1 = 1 \Rightarrow$ derivative of methane (CH_4)

$Y = 2 \Rightarrow$ No. of Hydrogen atoms = $2 - 1 = 1$

$Z = 2 \Rightarrow$ No. of Fluorine atoms = 2

The balance = $4 - \text{no. of (H+F) atoms} = 4 - 1 - 2 = 1 \Rightarrow$ No. of Chlorine atoms = 1

\therefore The chemical formula of R 22 = CHClF_2

2. Low boiling and freezing point.
High critical pressure and temperature.
High latent heat of vaporization.
Low specific heat of liquid, and high specific heat of vapor.
Low specific volume of vapor.
High thermal conductivity.
Non- corrosive to metal.
Non flammable and non explosive.
3. Chlorofluorocarbons (CFCs)
Hydrochlorofluorocarbons (HCFCs)
Hydrofluorocarbons (HFCs)
Hydrocarbons (HCs)



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Registration No.:

School of Refrigeration & Air conditioning Skills

Session: 2021-22 (Summer Semester)

B. Voc. Program, III Semester,

1st In-Sem. Examination

Course Code: RAC1302

Time: 1 Hour

Course Name: Central air-conditioning system practices

Max. Marks: 20

Instruction:

1. Read the question carefully, do attempt all

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 air cumulated per hour

Q2) Which lines in psychrometry shows dry bulb

- a. Horizontal lines
- b. vertical lines
- c. Lines on curve left
- d. enthalpy lines

Q3) humidity ratio is defined by

- a. Grains/pound of dry air
- b. gram/pound of dry air
- c. gravitation/kg of dew point air
- d. Number of air cumulated per hour

Q4) Chart of psychrometry is study of _____ Air?

- a. Moist air
- b. dry air
- c. moisture at defined temperatures
- d. pressure vs Enthalpy

Q5) Ventilation through fan, blower is classified as

- a. forced
- b. draught
- c. crossed
- d. stacked

Section – B

03X02 = 06 Marks

Q6. Mark the Psychrometric points below?

s.no	Dbt	Wbt	Dpt	% RH
1	70			40
2	75	65		

Q7) What is ventilation explain?

Q8) Draw a labelled diagram for Air scrubber

Section – C

03X03 = 09 Marks

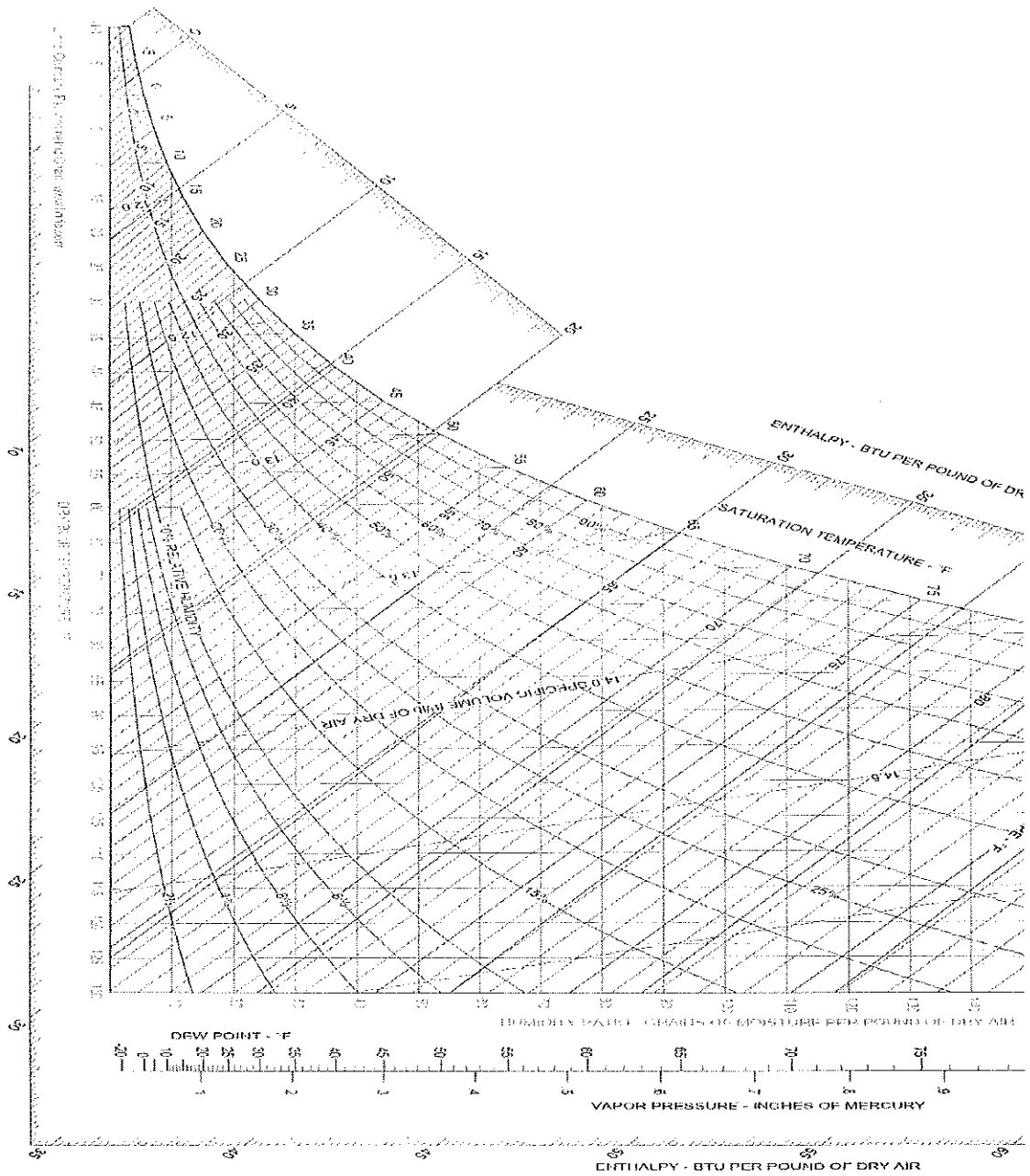
Q1) Types of ventilation used along with application ?

Q2) What is duct and its types

Q3) In a central Chiller plant Draw and explain the component with cycle?



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Instruction:

1. Read the question carefully, do attempt all

Section – A

05X01 = 05 Marks

- A1) a. Number of air change per hour
- A2) a. Horizontal lines
- A3) a. Grains/pound of dry air
- A4) c. moisture at defined temperatures
- A5) a. forced

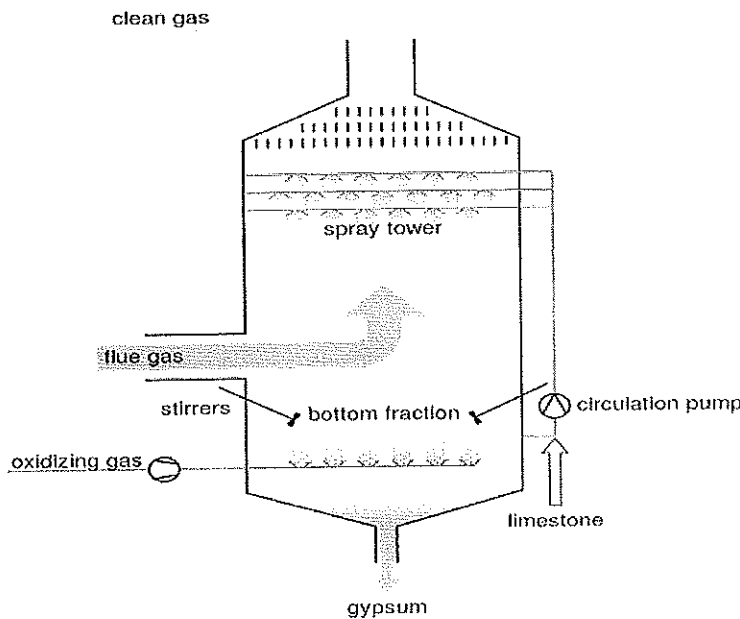
Section – B

03X02 = 06 Marks

A 6.

s.no	Dbt	Wbt	Dpt	% RH
1	70	55.75	44.6	40
2	75	65	59.66	58.9

A7. A7. Ventilation is the Exchange of Room air with Fresh air. • Sending Foul air out from the room/space and supplying fresh air into the room/space. • Ventilation is a vital requirement for the comfort and health of building occupants



A8.

Section – C

03X03 = 09 Marks

Q9) Types of ventilation used along with application?

A 9. Natural

- 1) single – side ventilation
- 2) cross flow ventilation
- 3) stack ventilation
- 4) Top - down ventilation

Artificial Forced

- 1) positive pressure
- 2) Horizontal Mechanical
- 3) Hydraulic

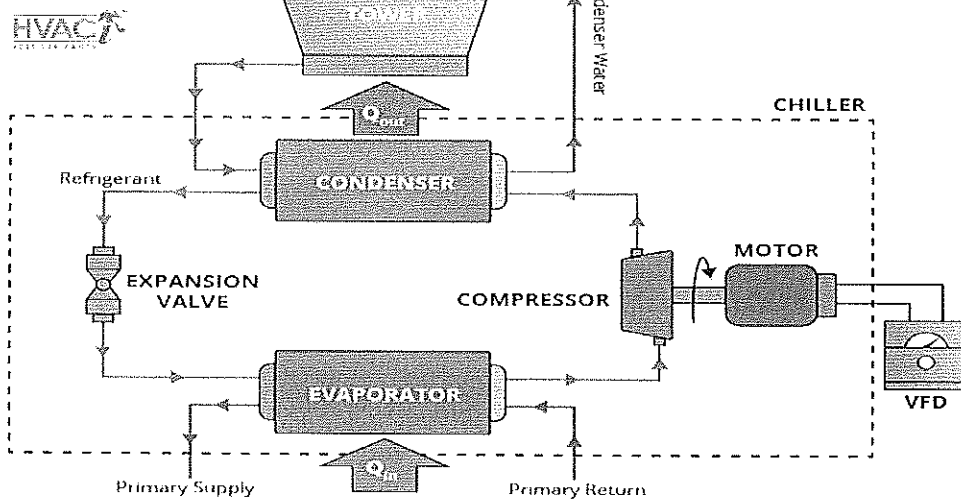
A10) Classify the duct based on

1) Shapes-ROUND SQUARE RECTANGLE, FLAT OVAL

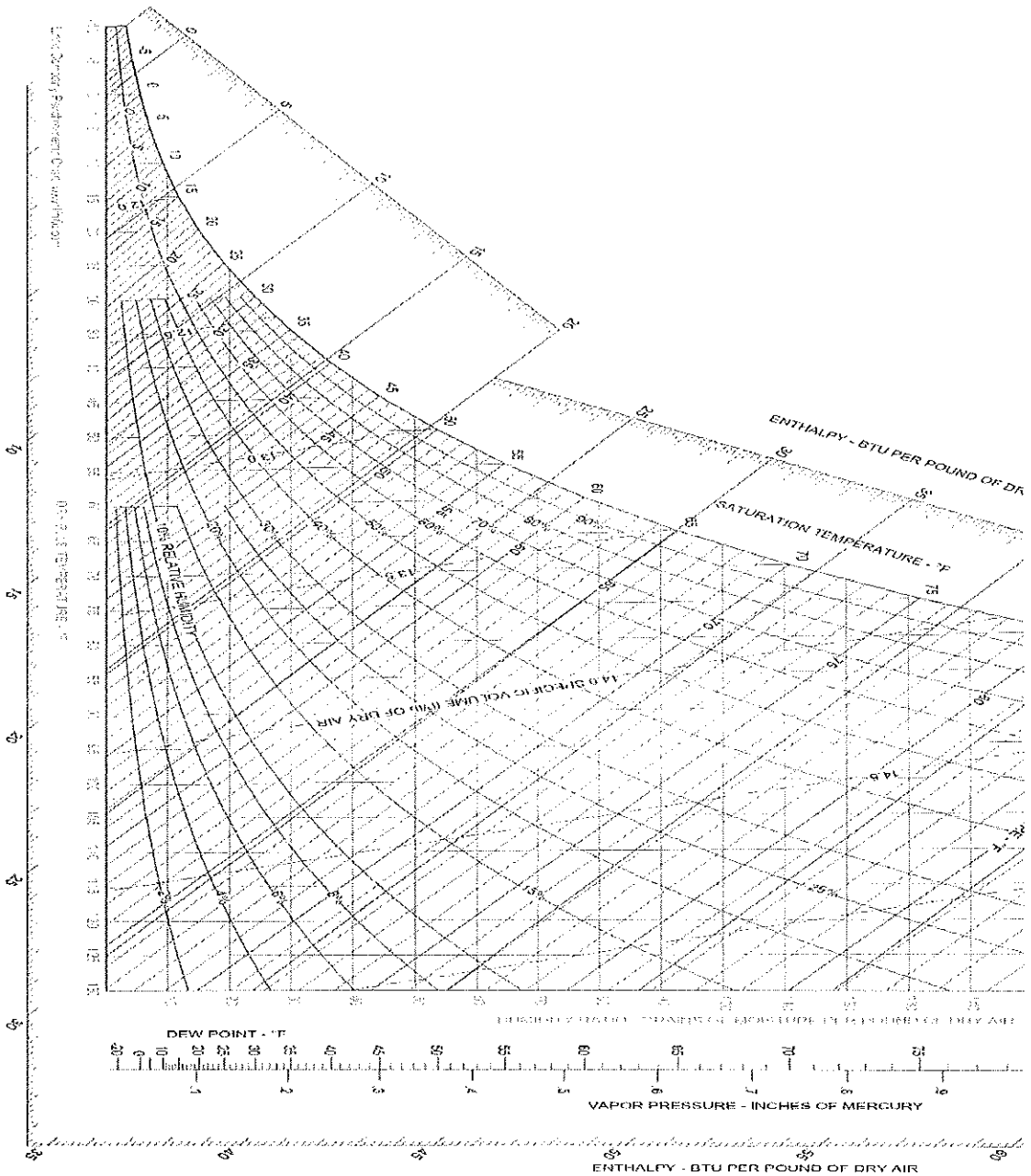
2) Velocity with range According to Duct velocity

1. Low – up to 1500 FPM
2. Medium -1500-2500 FPM
3. High-2500-4500 FPM

WATER-COOLED CHILLER DIAGRAM



A11)



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School of RAC Skills

III Semester, 1st In-Sem. Examination

B. Voc. Program, Summer Semester (2021-22)

Course Code: RAC1303

Time: 1 Hour

Course Name: RAC Electrical, Electronics & Instrumentation-II

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. The construction of Single phase induction motor is :
 - a. Complicated
 - b. Robust
 - c. Simple and robust
 - d. None of the above
2. What is RSIR?
 - a. Resistor start Inductor run.
 - b. Resistor start impedance run
 - c. Resilience start insulating run
 - d. All of the above
3. What is CSIR?
 - a. Capacitor start inductor run
 - b. Capacitor start impedance run
 - c. Control start inductance run
 - d. None of the above
4. Fleming's left hand rule is for .
 - a. Motors
 - b. Generators
 - c. Transformers



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d. Alternators

5. Split phase induction motors have two winding naming.

- a. Starting and running winding
- b. Main and auxiliary winding
- c. Current and relay winding
- d. Both a & b

Section – B

03X02 = 06 Marks

1. Explain the Electromagnetic induction.
2. What is power factor.
3. Explain the advantage of Single phase induction motors.

Section – C

03X03 = 09 Marks

1. Explain difference between AC and DC.
2. Write the types of AC motors.
3. Write the types of DC motors .

Rings



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School of RAC Skills

III Semester, 1st In-Sem. Examination

B. Voc. Program, Summer Semester (2021-22)

ANSWER KEY

Course Code: RAC1303

Course Name: RAC Electrical, Electronics & Instrumentation-II

Time: 1 Hour

Max. Marks: 20

Answer Key

Section – A

05X01 = 05 Marks

1. The construction of Single phase induction motor is:
 - c. Simple and robust

2. What is RSIR?
 - a. Resistor start Inductor run.

3. What is CSIR?
 - a. Capacitor start inductor run

4. Fleming's left hand rule is for .
 - a. Motors

5. Split phase induction motors have two winding naming.
 - d. Both a & b

Section – B

03X02 = 06 Marks

1. Explain the Electromagnetic induction.

ANSWER: Electromagnetic or magnetic induction is the production of an electromotive force across an electrical conductor in a changing magnetic field. Michael Faraday is generally credited with the discovery of induction in 1831.

2. What is power factor?

**BHARATIYA SKILL DEVELOPMENT UNIVERSITY****ANSWER:**

Power Factor is a measure of how effectively incoming power is used in your electrical system (energy efficiency) and is defined as the ratio of Real (working) power to Apparent (total) power.

3. Explain the advantage of Single phase induction motors.

ANSWER:

- ⌚ Fixed loads requiring not more than 0.5KW can generally be served most economically with single phase power and a single phase motor.
- ⌚ Single phase motors are simple in construction, reliable, easy to repair and comparatively cheaper in cost and therefore, find wide use in fans, refrigerators, vacuum cleaners, washing machines, other kitchen equipment, tools, blowers, centrifugal pumps, small farming appliances etc.

Section – C

03X03 = 09 Marks

1. Explain difference between AC and DC

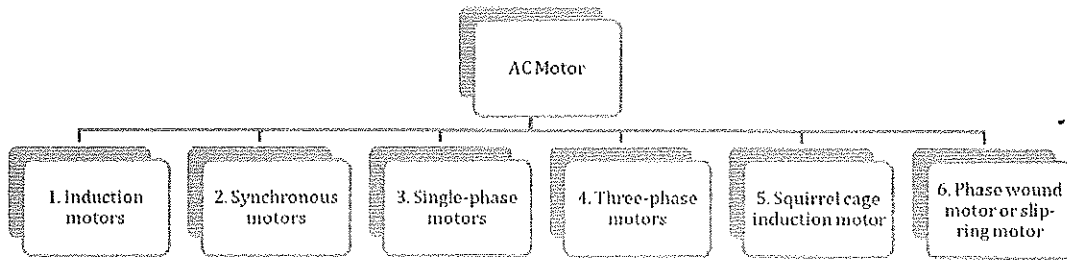
Answer : The major differences between Alternating Current and Direct Current are given in the table below:

Alternating Current	Direct Current
AC is safe to transfer longer distance even between two cities, and maintain the electric power.	DC cannot travel for a very long distance. It loses electric power.
The rotating magnets cause the change in direction of electric flow.	The steady magnetism makes DC flow in a single direction.
The frequency of AC is dependent upon the country. But, generally, the frequency is 50 Hz or 60 Hz.	DC has no frequency of zero frequency.
In AC the flow of current changes its direction backwards periodically.	It flows in a single direction steadily.

2. Write the types of AC motors.

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Answer: Types of AC motors are :



3. Write the types of DC motors.

Answer:

1. Shunt DC motor:
2. Separately Excited motor
3. Series motor
4. Permanent Magnet (PMDC) motors:

Singh





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School of RAC Skills

III Semester, 1st In-Sem. Examination

B. Voc. Program, Summer Semester (2021-22)

Course Code: RAC1304

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



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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. Write a short note on cold store doors.
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.
3. Explain different types of insulation in detail.



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School of RAC Skills

III Semester, 1st In-Sem. Examination

B. Voc. Program, Summer Semester (2021-22)

ANSWER KEY

Course Code: RAC1304

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.

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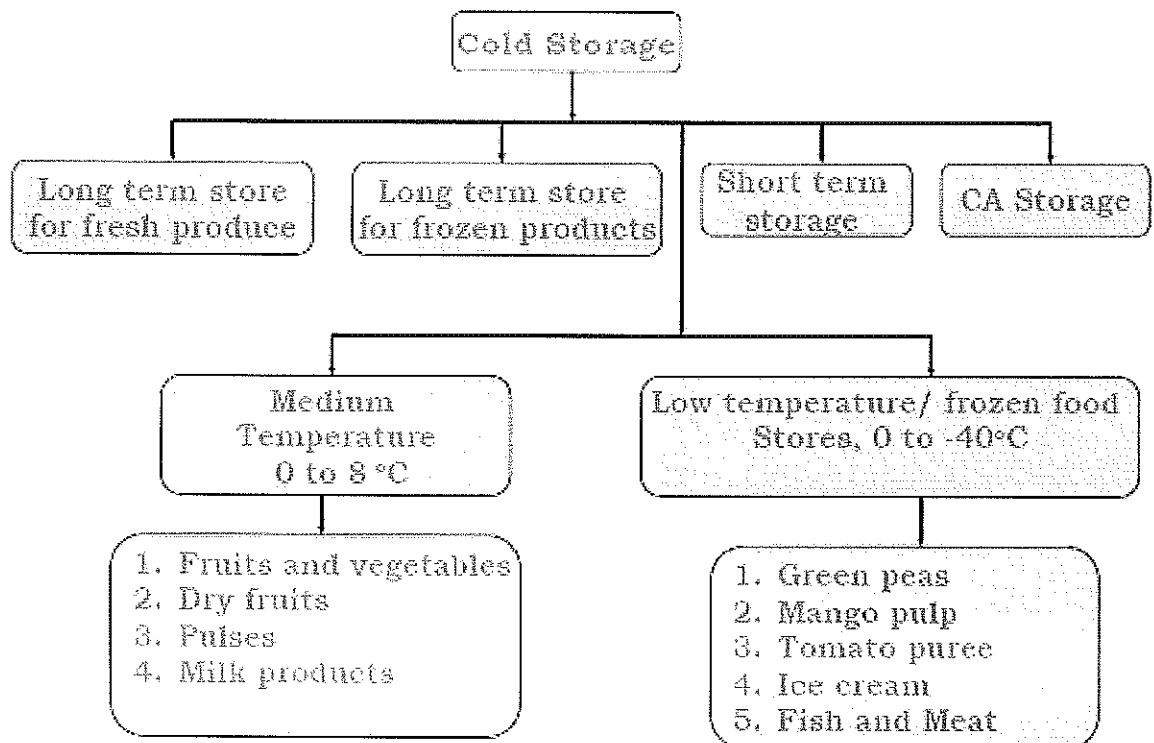
A cool store or cold store is a large refrigerated room or building designed for storage of goods in an environment below the outdoor temperature. Products needing refrigeration include fruit, vegetables, seafood and meat. Cold stores are often located near shipping ports used for import/export of produce.

2. Write a short note on cold store doors.

When choosing a door system the following should be considered

- Is the track designed to give a good positive sealing action without undue wear to the sealing gaskets and will it be strong enough for its usage?
- Does it allow the door to be adjusted easily and accurately in all directions?
- Are the runners durable and will they allow free running?
- Will the handles, both inside and outside, allow easy opening of the door?
- Can the system be locked and does it have an emergency release facility?
- Do the moving parts require little maintenance and can they be easily replaced in the event of damage?

3. Write down the different types of cold storages.

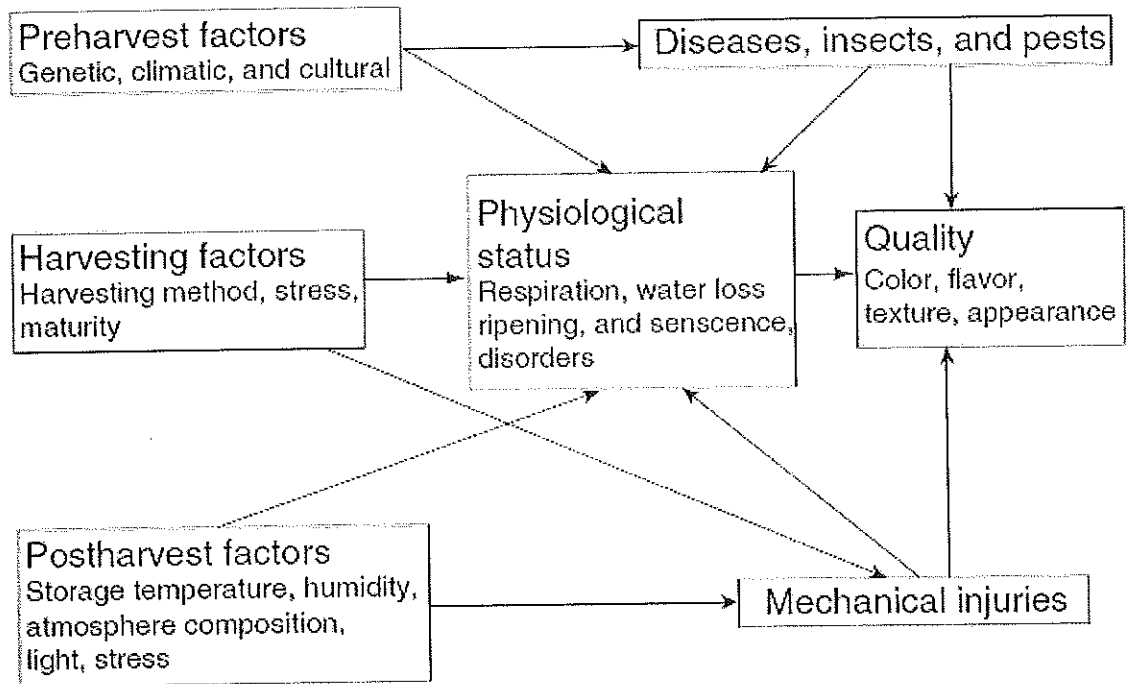


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Section – C

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.

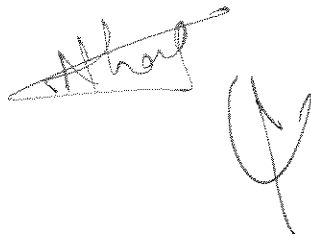
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Extruded polystyrene

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.



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