

THEORY 1 st - IN-SEM EXAMINATION			
SESSION: 2022-23(SUMMER SEMESTER)			
B.Voc	Semester	3 rd	
Course name / Module	Central Air Conditioning System Practices		
Course code	RAC1302		
Date			
Name of the Student			Reg. No.

INSTRUCTIONS

- Maximum Marks: **20**
- Duration of Examination: **01 Hour**
- Attempt all questions.
- Any other instruction may be included, If required.

1. Section A (05 objective type questions, each question carries 01 mark)	05×1 = 05
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- 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
d. 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

2. Section B (03 short answer type questions, each question carries 02 marks)	03×02 = 06
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Q1. Mark the Psychrometric points below?

S. No.	DBT (F)	WBT (F)	DPT (F)	% RH
1	70			40
2	75	65		

Q2) What is ventilation. explain?

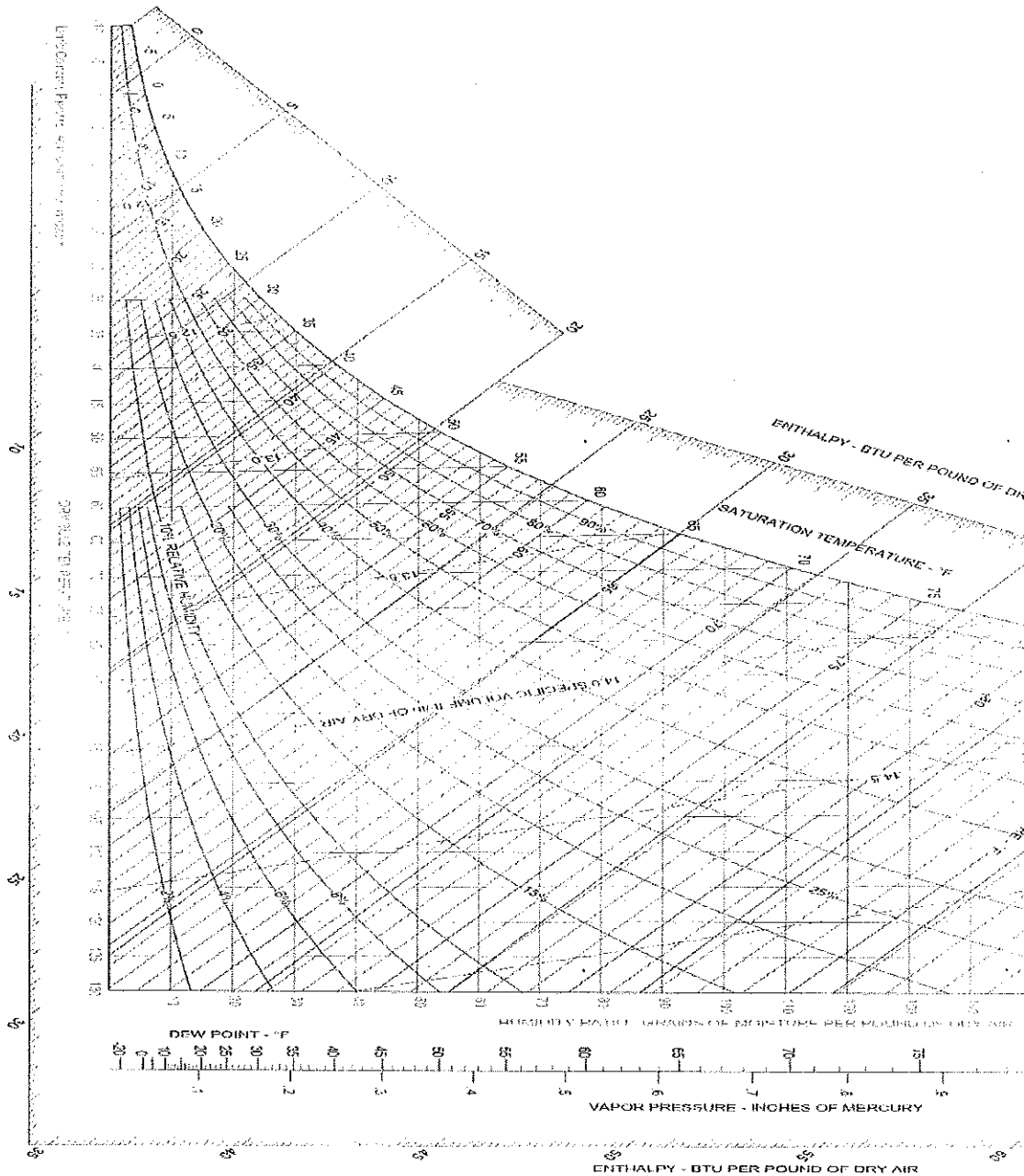
Q3) Define: CFM, FPM and area. Write relation among them.

3. Section C (03 long type questions, each question carries 03 marks) **03×03 = 09**

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?



Shiraj



THEORY 1 st - IN-SEM EXAMINATION		
SESSION: 2022-23(SUMMER SEMESTER)		
B.Voc/M.Voc	Semester	3rd
Course name / Module	Psychrometry and System Design	
Course code	RAC1301	
Date		
Name of the Student	Reg. No.	

INSTRUCTIONS

- Maximum Marks: **20**
- Duration of Examination: **01 Hour**
- Attempt all questions.

1. Section A (05 objective type questions, each question carries 01 mark) **05×1 = 05**

1. Convert 32 degree celcius into Fahrenheit?

- a. 0
b. 49.77
c. 89.6
d. 50

2. It is a mixture of dry air and super heated water vapour.

- a. Dry Air
b. Composite air
c. Saturated air
d. Unsaturated air

3. The _____ is the temperature the air needs to be cooled to (at constant pressure) in order to achieve a relative humidity (RH) of 100%.

- a. Ambient temperature
b. MWBC
c. DPT
d. DB

4. Above the altitude of about _____, atmospheric air consists of only dry air

- a. 65000 ft
b. 20 km
c. 32808.4 ft
d. 25km

5. A psychrometric process that involves the increase or decrease in the temperature of air without changing its humidity ratio

a. Sensible Heating	b. Sensible Cooling
c. Cooling with dehumidification	d. Sensible heating or cooling

Cont..

2. Section B (03 short answer type questions, each question carries 02 marks)**03×02 = 06**

6. What are indoor and outdoor design conditions ?
7. Write a short note on solar gain in a building through various sources.
8. What are the various latent heat sources in a building

3. Section C (03 long type questions, each question carries 03 marks)**03×03 = 09**

9. Write a short note on different line in psychrometry chart.
10. What is the wet bulb temperature, how it is useful in system design process?
11. Explain the effective room sensible heat.





THEORY 1 st - IN-SEM EXAMINATION		
SESSION: 2022-23(SUMMER SEMESTER)		
B.Voc/M.Voc	Semester	5th
Course name / Module	RAC Design and Simulation	
Course code	RAC1501	
Date		
Name of the Student	Reg. No.	

INSTRUCTIONS
<ul style="list-style-type: none">• Maximum Marks: 20• Duration of Examination: 01 Hour• Attempt all questions.

1. Section A (05 objective type questions, each question carries 01 mark)	05×1 = 05
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- _____ either a volume or a site without a partition or a partitioned room or group of room.
 - Zone
 - Space
 - Floor
 - Site
- _____ is the temperature to which air must be cooled in order to reach saturation.
 - DBT
 - MWBC
 - DPT
 - Very low temperature
- CLTD is known as ?
 - Cooling Load Temperature Differential
 - Cooling Load Temperature Difference
 - Common low Temperature Difference
 - Cooling Load total Differential
- Mean daily range (DR) of the dry bulb temperature, which is the mean of the temperature difference between daily _____ and _____ temperatures for the warmest month.
 - Minimum, Maximum,
 - Minimum, Minimum
 - Maximum, minimum
 - Maximum, Maximum
- _____ is a method of designing and controlling the HVAC system so that occupied areas can be maintained at a different temperature than unoccupied areas using independent setback thermostats.

a. Thermal cooling capacity control	b. Thermal Spacing
c. Passive Ventilation	d. Thermal Zoning

Cont..

2. Section B (03 short answer type questions, each question carries 02 marks)	03×02 = 06
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6. What is bypass factor and how it effect cooling load calculation?
7. Write a short note on relative and absolute humidity.
8. What is transmission gain in respect of cooling load calculation.

3. Section C (03 long type questions, each question carries 03 marks)	03×03 = 09
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9. Write a short note on building energy loads.
10. Explain the role of conduction convection and radiation in building heat load.
11. Explain the various factors influence sensible and latent heat sources in a building to be air conditioned?

By

John Doe

THEORY 1 ST - IN-SEM EXAMINATION		
SESSION: 2022-23(SUMMER SEMESTER)		
B.Voc/M.Voc	Semester	3rd
Course name / Module	RAC Electrical,Electronics & Instrumentation - II	
Course code	RAC1303	
Date		
Name of the Student		Reg. No.

INSTRUCTIONS

- Maximum Marks: **20**
- Duration of Examination: **01 Hour**
- Attempt all questions.
- Any other instruction may be included, If required.

1. Section A (05 objective type questions, each question carries 01 mark)

05×1 = 05

- The construction of Single phase induction motor is :
 - Complicated
 - Robust
 - Simple and robust
 - None of the above
- What is RSIR?
 - Resistor start Inductor run.
 - Resistor start impedance run
 - Resilience start insulating run
 - All of the above
- What is CSIR?
 - Capacitor start inductor run
 - Capacitor start impedance run
 - Control start inductance run
 - None of the above
- What is CSCR?
 - Capacitor start inductor run
 - Capacitor start capacitor run
 - Control start inductance run
 - Allof the above
- Split phase induction motors have two winding naming.
 - Starting and running winding
 - Main and auxiliary winding

- (c) Current and relay winding
- (d) Both a & b

2. Section B (03 short answer type questions, each question carries 02 marks)	03×02 = 06
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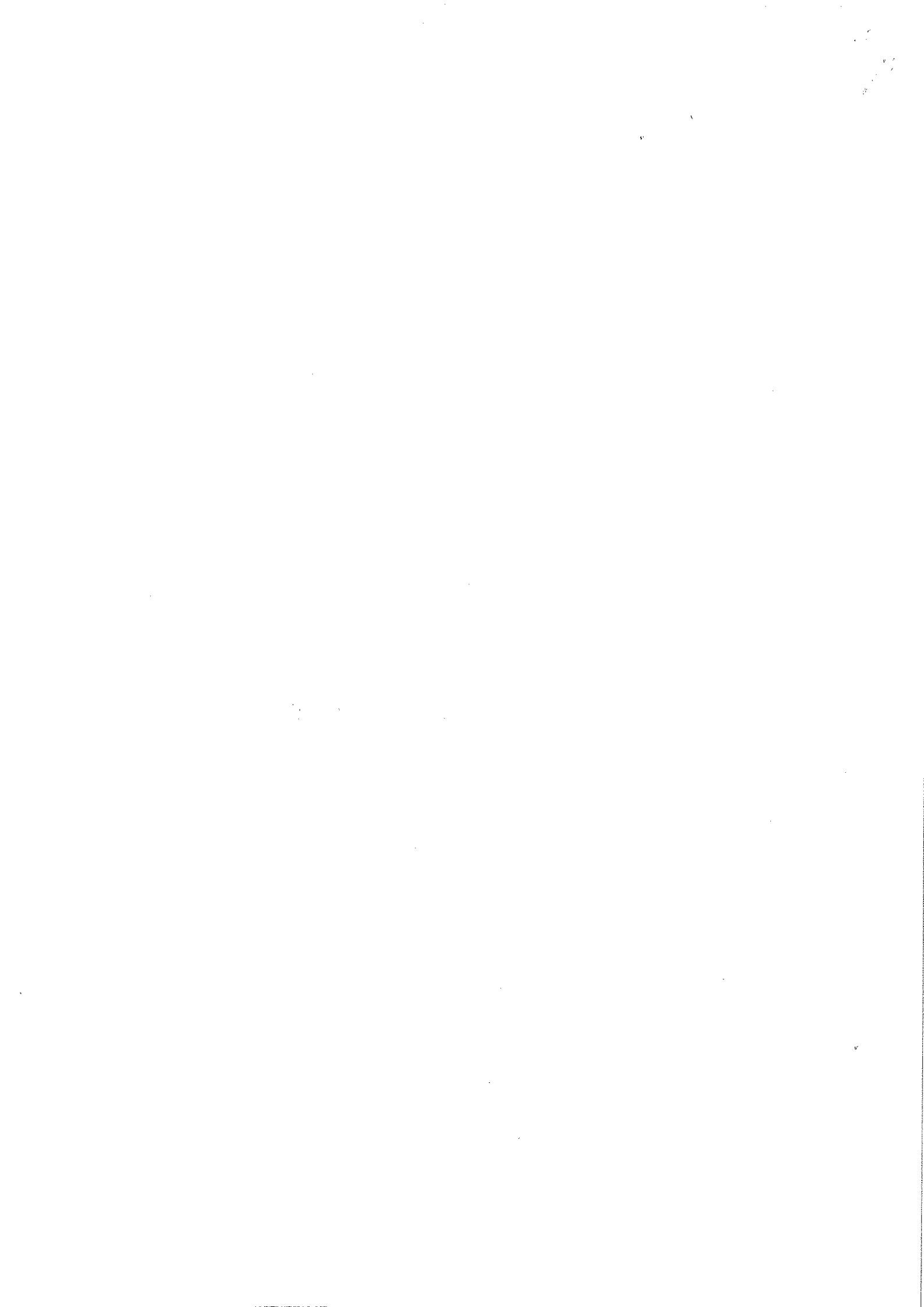
- 6. Explain RSIR motor.
- 7. Explain the disadvantage of Single phase induction motors.
- 8. Explain the advantage of Single phase induction motors.

3. Section C (03 long type questions, each question carries 03 marks)	03×03 = 09
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- 9. Explain RSIR motor applications.
- 10. Explain CSIR motor applications.
- 11. What is CSCR motor?

Q Singh

8/11/11



THEORY 1 st - IN-SEM EXAMINATION		
SESSION: 2022-23(SUMMER SEMESTER)		
B.Voc/M.Voc	Semester	5th
Course name / Module	RAC Controls and Building Management System	
Course code	RAC1502	
Date		
Name of the Student	Reg. No.	

INSTRUCTIONS
<ul style="list-style-type: none"> • Maximum Marks: 20 • Duration of Examination: 01 Hour • Attempt all questions.

1. Section A (05 objective type questions, each question carries 01 mark)	05×1 = 05
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- Pressure relief falls into which category of valves classification?
 - On-off valve
 - Shut off valve
 - Throttling Valve
 - Function Valve
- Usually a sensing device is used to compare the actual state (e.g. temperature) with a _____.
 - Room/space conditions
 - Standard condition
 - Target state
 - Temperature/pressure state
- Thermistors are temperature sensitive _____ that exhibit a large change in resistance over a relatively small range of temperature
 - device
 - resistance bridge
 - semiconductor
 - Wire
- Relative humidity sensor based on a layer of hygroscopic salt, such as lithium chloride or carbon powder deposited _____.
 - between two layers
 - between two electrodes
 - in a cell
 - in a resistive bi-metallic strip
- A fixed plate forms one part of the capacitor assembly and a flexible plate is the other part of the capacitor assembly, which type of sensor it can be?

a. Capacitive temperature sensor	b. Capacitive pressure sensor
c. Capacitive humidity sensor	d. Both a and b

Cont..

2. Section B (03 short answer type questions, each question carries 02 marks)	03×02 = 06
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6. What is special purpose valve ?
7. Write a short note on elementary control systems purpose.
8. What is a thermocouple, explain its working principle?

3. Section C (03 long type questions, each question carries 03 marks)	03×03 = 09
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9. Write a short note on energy sources for control systems.
10. Explain the working of a magnetic contactor.
11. Explain the general working of a sensor.

By

John S.

THEORY 1st - IN-SEM EXAMINATION			
SESSION: 2022-23(SUMMER SEMESTER)			
B.Voc/M.Voc	B. Voc.	Semester	3rd
Course name	Cold Chain & Storage		
Course code	RAC1304		
Date			
Name of the Student			Reg. No.

INSTRUCTIONS
<ul style="list-style-type: none"> • Maximum Marks: 20 • Duration of Examination: 01 Hour • Attempt all questions.

1. Section A (05 objective type questions, each question carries 01 mark)	05×1 = 05
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2. 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

2. Section B (03 short answer type questions, each question carries 02 marks)	03×02 = 06
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1. What is a cold chain system?
2. What is a cold storage system?
3. What is food preservation?

1. Section C (03 long type questions, each question carries 03 marks)	03×03 = 09
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1. Explain preharvest physiology of fruits and vegetables through neat sketch.
2. What are the foods and causes of food deterioration?
3. Write down the different types of cold storages.

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THEORY 1 st - IN-SEM EXAMINATION		
SESSION: 2022-23(SUMMER SEMESTER)		
B.Voc	Semester	5 th
Course name / Module	Chilled water supply system design	
Course code	RAC1503	
Date		
Name of the Student		Reg. No.

INSTRUCTIONS
<ul style="list-style-type: none">• Maximum Marks: 20• Duration of Examination: 01 Hour• Attempt all questions.• Any other instruction may be included, If required.

1. Section A (05 objective type questions, each question carries 01 mark)	05×1 = 05
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Q. 1: When a chiller is used, the secondary refrigerant that circulates in the building is

- A. Air
B. water
C. brine
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: VCRC cycle does not have.

- A. Compressor
B. Condenser
C. Generator
D. Evaporator

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

- A. NH₃
B. CO₂
C. R-12
D. none of these

2. Section B (03 short answer type questions, each question carries 02 marks)	03×02 = 06
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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?

3. Section C (03 long type questions, each question carries 03 marks)
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03×03 = 09

- 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.

Shubh Jais

THEORY 1 st - IN-SEM EXAMINATION			
SESSION: 2022-23(SUMMER SEMESTER)			
B.Voc/M.Voc	B. Voc.	Semester	5 th
Course name	AC System & Testing		
Course code	RAC1504		
Date			
Name of the Student		Reg. No.	

INSTRUCTIONS
<ul style="list-style-type: none"> • Maximum Marks: 20 • Duration of Examination: 01 Hour • Attempt all questions.

1. Section A (05 objective type questions, each question carries 01 mark)	05×1 = 05
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- Who provides the Make up water tank for condenser water?
 - Department
 - Contractor
 - Both a & b
 - None of the above
- How many electrical points are supplied by the department?
 - 1
 - 2
 - 3
 - 4
- Whose responsibility is the Safe custody of all machinery and equipment supplied at site?
 - Department
 - Contractor
 - Both a & b
 - None of the above
- What is the lebeled name for Chilled water?
 - CHW
 - CDW
 - CHHW
 - None of the above
- Final inspection and testing is done by-.
 - Department
 - Contractor
 - Engineer in charge
 - None of the above

2. Section B (03 short answer type questions, each question carries 02 marks)	03×02 = 06
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1. Write down the guarantee procedures for machines and equipment installed.
2. What is a cold storage system?
3. Write down the importance of color scheme for equipment.

1. Section C (03 long type questions, each question carries 03 marks)
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03x03 = 09

1. Visiting site before tendering is beneficial. How?
2. Write down the works to be arranged by the department.
3. Write down the works to be arranged by the Contractor.

Alhady

sketch for



THEORY 1 st - IN-SEM EXAMINATION		
SESSION: 2022-23(SUMMER SEMESTER)		
B.Voc/M.Voc	Semester	3rd
Course name / Module	Psychrometry and System Design	
Course code	RAC1301	
Date		
Name of the Student	Reg. No.	

INSTRUCTIONS

- Maximum Marks: **20**
- Duration of Examination: **01 Hour**
- Attempt all questions.

Answer Sheet

1. Section A (05 objective type questions, each question carries 01 mark)	05×1 = 05
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- Convert 32 degree celcius into Fahrenheit?
a. 0
b. 49.77
c. **89.6**
d. 50
- it is a mixture of dry air and super heated water vapour.
a. Dry Air
b. Composite air
c. Saturated air
d. **Unsaturated air**
- The _____ is the temperature the air needs to be cooled to (at constant pressure) in order to achieve a relative humidity (RH) of 100%.
a. Ambient temperature
b. MWBC
c. **DPT**
d. DB
- Above the altitude of about _____, atmospheric air consists of only dry air
a. 65000 ft
b. 20 km
c. **32808.4 ft**
d. 25km
- A psychrometric process that involves the increase or decrease in the temperature of air without changing its humidity ratio

a. Sensible Heating	b. Sensible Cooling
c. Cooling with dehumidification	d. Sensible heating or cooling

Cont..

2. Section B (03 short answer type questions, each question carries 02 marks)	03×02 = 06
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6. What are indoor and outdoor design conditions ?

Answer:

The outdoor design data is usually determined as follows,

According to the statistical analysis of the weather data (meteorological data) so that 1, 2.5 or 5% of the total possible operating

hours is equaled or exceeded the outdoor design values. Summer Design Condition The recommended summer design and coincident wet bulb temperature, when chosen as being equaled to or exceeded by 2.5% of the total number of hours (i.e. 2928 hours) in June, July, August and September, are (i) 23 o C dry bulb temperature, and (ii) 28 o C wet bulb temperature.

Winter design condition The recommended winter design and coincident relative humidity, when chosen as being equaled to or exceeded by 1% or 2.5% of the total number of hours (i.e. 2160 hours) in December, January and February, are (i) 9 o C dry bulb temperature, and (ii) 50% relative humidity

7. Write a short note on sensible heat gain in a building through various sources.

Answer: The heat flowing into the building by conduction through exterior walls, floors, ceiling, doors and windows due to the temperature difference on their two sides. b- The heat received from the solar radiation. It consists of the heat transmitted directly through glass of windows, ventilators or doors, and the heat absorbed by walls and roofs exposed to solar radiation and later on transferred to the room by conduction. c- The heat conducted through interior partition from rooms in the same building which are not conditioned. d- The heat given off by lights, motors, machinery, cooking operations, industrial processes ...etc. e- The heat liberated by the occupants.

8. What are the various latent heat sources in a building

Answer: Latent heat gain of ventilation due to difference of humidity between the fresh air and the air in space (outside and inside air). b- The heat gain due to moisture in the outside air entering by infiltration. c- The heat gain due to condensation of moisture from occupants. d- The heat gain due to condensation of moisture from any process such as cooking foods which takes place within the conditioned space. e- The heat gain due to moisture passing directly into the conditioned space through the permeable walls or partitions from the outside or from adjoining regions where the water vapor pressure is higher.

3. Section C (03 long type questions, each question carries 03 marks)	03×03 = 09
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9. Write a short note on different line in psychrometry chart.

Answer:

Dry Bulb line, Wet bulb line Temperature, absolute humidity line, enthalpy line, specific volume line, relative humidity line, dew point temperature line, saturation curve.

10. What is the wet bulb temperature, how it is useful in system design process?

Answer: The Wet Bulb temperature is the temperature of adiabatic saturation. This is the temperature indicated by a moistened thermometer bulb exposed to the air flow.

Wet Bulb temperature can be measured by using a thermometer with the bulb wrapped in wet muslin. The adiabatic evaporation of water from the thermometer and the cooling effect is indicated by a "wet bulb temperature" lower than the "dry bulb temperature" in the air.

The rate of evaporation from the wet bandage on the bulb, and the temperature difference between the dry bulb and wet bulb, depends on the humidity of the air. The evaporation is reduced when the air contains more water vapor.

The wet bulb temperature is always lower than the dry bulb temperature but will be identical with 100% relative humidity (the air is at the saturation line).

Combining the dry bulb and wet bulb temperature in a psychrometric diagram or Mollier chart, gives the state of the humid air. Lines of constant wet bulb temperatures run diagonally from the upper left to the lower right in the Psychrometric Chart.

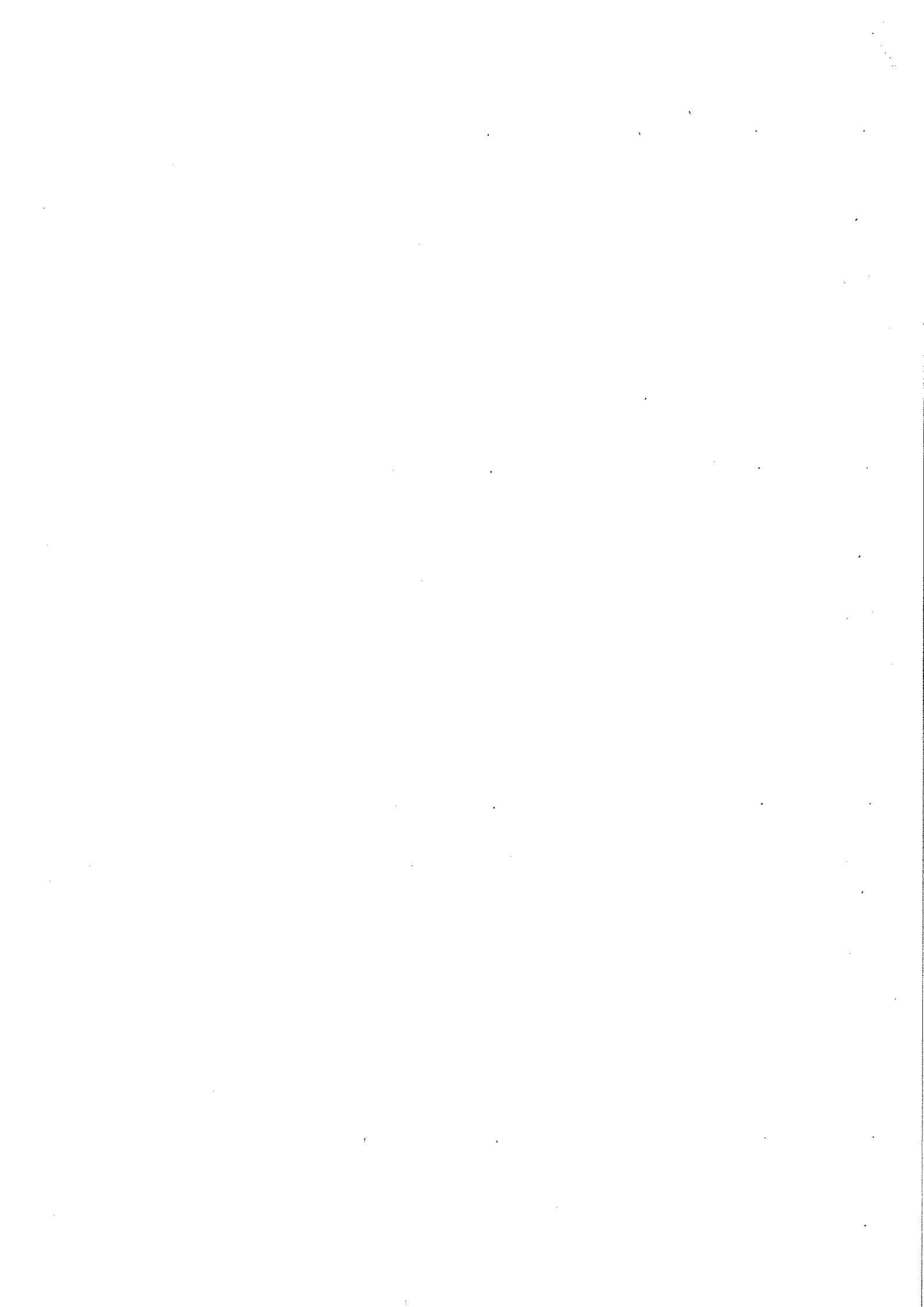
11. Explain the effective room sensible heat.

Answer:

Solar Gain Glass + Solar and Transmission Gain Wall and roof + Transmission Gain except wall and roof + Infiltration and outside air + Internal Heat + Room sensible Heat + 5 % factor of safety is known as Effective room sensible heat.

Item	Area of quantity	Sun Gain or Temp. Diff.	Factor	Btu / Hour
SOLAR GAIN GLASS				
	Glass	Sq. Ft. x	x	
	Glass	Sq. Ft. x	x	
	Glass	Sq. Ft. x	x	
	Glass	Sq. Ft. x	x	
	Sky Light	Sq. Ft. x	x	
SOLAR AND TRAINS GAIN - WALLS AND ROOF				
	Wall	Sq. Ft. x	x	
	Wall	Sq. Ft. x	x	
	Wall	Sq. Ft. x	x	
	Wall	Sq. Ft. x	x	
	Wall	Sq. Ft. x	x	
	Roof Sun	Sq. Ft. x	x	
	Roof Shaded	Sq. Ft. x	x	
TRAIN GAIN EXCEPT WALLS AND ROOF				
	All Glass	Sq. Ft. x	x	
	Partition	Sq. Ft. x	x	
	Ceiling	Sq. Ft. x	x	
	Floor	Sq. Ft. x	x	
INFILTRATION AND OUTSIDE AIR				
	Infiltration	Cfm x	X 1.08	
	Outside Air	Cfm x °F	BF X 1.08	
INTERNAL HEAT				
	People	People		
	Power	H.P. / KW		
	Lights		x 1.08	
	Appliances Etc.		x	
ROOM SENSIBLE HEAT				
	Supply	Supply		
	Duct	Duct		
	Heat Gain%	Leak Loss %		
EFFECTIVE ROOM SENSIBLE HEAT				

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THEORY 1 st - IN-SEM EXAMINATION			
SESSION: 2022-23(SUMMER SEMESTER)			
B.Voc	Semester 3 rd		
Course name / Module	Central Air Conditioning System Practices		
Course code	RAC1302		
Date			
Name of the Student		Reg. No.	

Answer Sheet

1. Section A (05 objective type questions, each question carries 01 mark)	05×1 = 05
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- A1) a. Number of air change per hour
 A2) a. Horizontal lines
 A3) a. Moist air
 A4) c. moisture air
 A5) a. forced

2. Section B (03 short answer type questions, each question carries 02 marks)	03×02 = 06
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A 1.

s.no	DBT (F)	WBT (F)	DPT (F)	% RH
1	70	55.75	44.6	40
2	75	65	59.66	58.9

A2.

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.

A3. Define: CFM, FPM and area. Write relation among them.

- **CFM:** volume of air flow; cubic feet/minute
- **FPM:** velocity or speed of air flow; feet/minute
- **Area (sq.ft):** duct size or cross-sectional area; square feet

Relation, $CFM = FPM \times Area$

3. Section C (03 long type questions, each question carries 03 marks)	03×03 = 09
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Q1) Types of ventilation used along with application?

A 1. 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

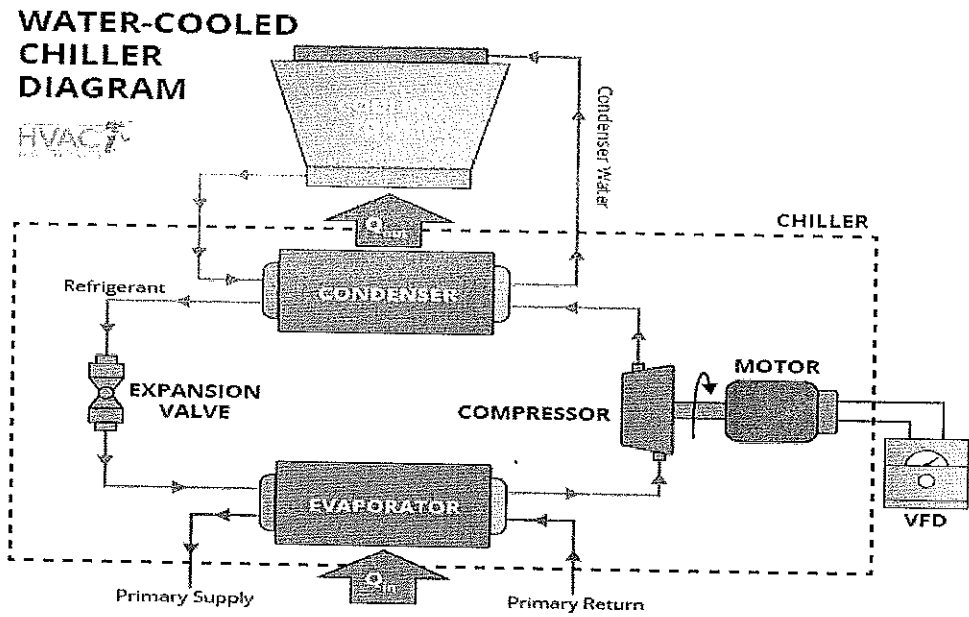
A2) Classify the duct based on

1) Shapes-round, square, rectangle, flat and 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

A3)





THEORY 1 st - IN-SEM EXAMINATION		
SESSION: 2022-23(SUMMER SEMESTER)		
B.Voc/M.Voc	Semester	3rd
Course name / Module	RAC Electrical, Electronics & Instrumentation - II	
Course code	RAC1303	
Date		
Name of the Student	Reg. No.	

INSTRUCTIONS

- Maximum Marks: **20**
- Duration of Examination: **01 Hour**
- Attempt all questions.
- Any other instruction may be included, If required.

1. Section A (05 objective type questions, each question carries 01 mark) **05×1 = 05**

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. What is CSCR?
b. Capacitor start capacitor run
5. Split phase induction motors have two winding naming.
d. Both a & b

2. Section B (03 short answer type questions, each question carries 02 marks) **03×02 = 06**

6. Explain RSIR motor.

ANSWER: RSIR (Resistance Start-Induction Run) LST motor. No capacitors. Auxiliary winding is disconnected after start.

7. Explain the disadvantage of Single phase induction motors.

ANSWER:

- a. They have lower power factor.

- b. Lower efficiency.
 - c. These motors do not have inherent starting torque.
 - d. More expensive than three-phase motors of the same output.
 - e. Low overload capacity.
8. 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.

3. Section C (03 long type questions, each question carries 03 marks)	03×03 = 09
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9. Explain RSIR motor applications.

Answer : These motors are suitable where a moderate starting torque is required and where starting

periods are infrequent e.g., to drive:

- a. Fans
- b. washing machines

10. Explain CSIR motor applications.

Answer:

Since the motors possess high-starting torque, these motors are used for

- a. Refrigerators
- b. Air-conditioners
- c. Compressors

11. What is CSCR motor.

Answer: Capacitor Start Capacitor run motor is identical to a capacitor-start motor except that starting winding is not opened after starting so that both the winding remain connected to the supply when running as well as at starting.

Q Singh

Sharma

THEORY 1 st - IN-SEM EXAMINATION (ANSWER SHEET)			
SESSION: 2022-23(SUMMER SEMESTER)			
B.Voc/M.Voc	B. Voc.	Semester	3 rd
Course name	Cold Chain & Storage		
Course code	RAC1304		
Date			
Name of the Student		Reg. No.	

1. Section A (05 objective type questions, each question carries 01 mark)	05×1 = 05
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- Keeping in mind that texture changes take place after harvest, pulpy fruits become extremely hard after harvest.
 - False
- After harvest, _____ of fruits and vegetables undergoes change.
 - Texture, nutrients, minerals
- Which of the following is true about fruits and vegetable processing?
 - all of the mentioned
- Which of the following is not related to Post Harvest losses?
 - Farmers don't earn much after adding value to products
- Which of the following are Milk Processing Operations?
 - All of the mentioned

2. Section B (03 short answer type questions, each question carries 02 marks)	03×02 = 06
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- What is a cold chain system?

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. Its a transportation with refrigerated medium.

- What is a cold storage system?

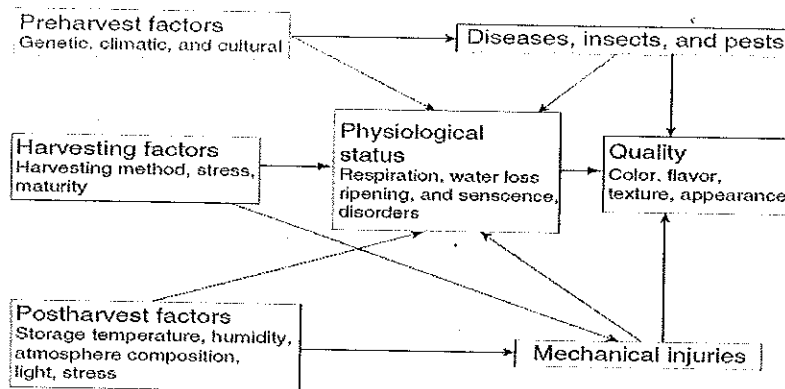
A cool store or cold store is a large refrigerated room or building designed for storage of goods in an environment below the outdoor temperature. Products needing refrigeration include fruit, vegetables, seafood and meat. Cold stores are often located near shipping ports used for import/export of produce.

- 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.

1. Section C (03 long type questions, each question carries 03 marks)	03×03 = 09
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1. Explain preharvest physiology of fruits and vegetables through neat sketch.

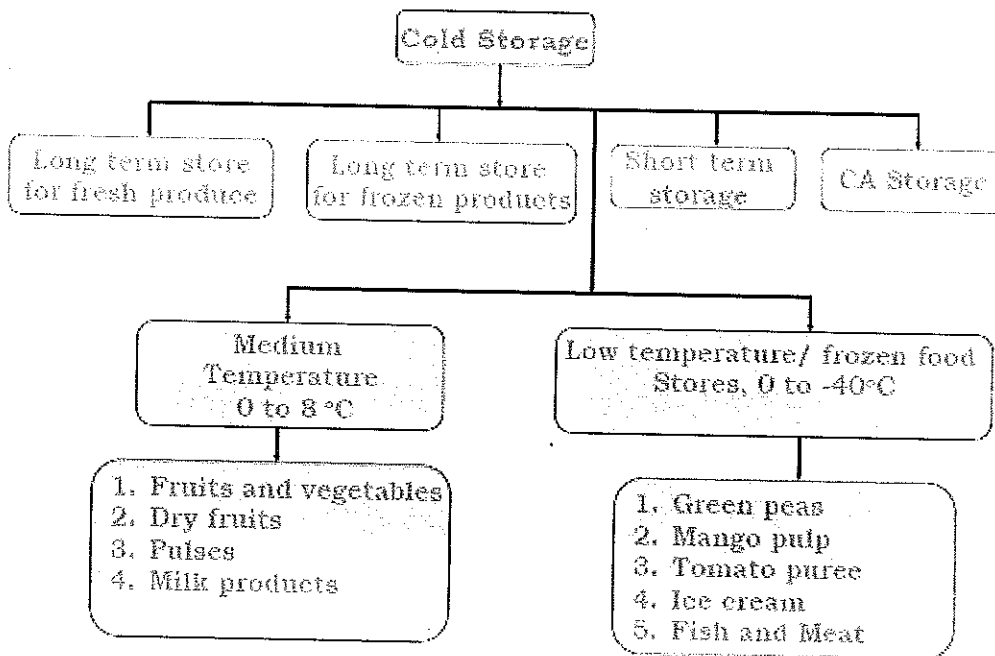


2. What are the foods and causes of food deterioration?

Foods are materials, raw, processed, or formulated, that are consumed orally by humans or animals for growth, health, satisfaction, pleasure, and satisfying social needs.

Mechanical, physical, chemical, and microbial effects are the leading causes of food deterioration and spoilage. Damage can start at the initial point by mishandling of foods during harvesting, processing, and distribution; this may lead to ultimate reduction of shelf life.

3. Write down the different types of cold storages.



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THEORY 1 st - IN-SEM EXAMINATION		
SESSION: 2022-23(SUMMER SEMESTER)		
B.Voc/M.Voc	Semester	5th
Course name / Module	RAC Design and Simulation	
Course code	RAC1501	
Date		
Name of the Student	Reg. No.	

INSTRUCTIONS

- Maximum Marks: **20**
- Duration of Examination: **01 Hour**
- Attempt all questions.

Answer Sheet

1. Section A (05 objective type questions, each question carries 01 mark) **05×1 = 05**

- _____ either a volume or a site without a partition or a partitioned room or group of room.
 - Zone
 - Space**
 - Floor
 - Site
- _____ is the temperature to which air must be cooled in order to reach saturation.
 - DBT
 - MWBC
 - DPT**
 - Very low temperature
- CLTD is known as ?
 - Cooling Load Temperature Differential**
 - Cooling Load Temperature Difference
 - Common low Temperature Difference
 - Cooling Load total Differential
- Mean daily range (DR) of the dry bulb temperature, which is the mean of the temperature difference between daily _____ and _____ temperatures for the warmest month.
 - Minimum, Maximum,
 - Minimum, Minimum
 - Maximum, minimum**
 - Maximum, Maximum
- _____ is a method of designing and controlling the HVAC system so that occupied areas can be maintained at a different temperature than unoccupied areas using independent setback thermostats.

a. Thermal cooling capacity control	b. Thermal Spacing
c. Passive Ventilation	d. Thermal Zoning

Cont..

2. Section B (03 short answer type questions, each question carries 02 marks)	03×02 = 06
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6. What is bypass factor and how it effect cooling load calculation

Answer: By-Pass factor: The inability of a coil to cool or heat the air to its temperature is indicated by a factor called by-pass factor (BPF) or Coil Bypass Factor. This inability is due to the coil inefficiency and some amount of air just bypassing the coil without getting affected by it.

Factors affecting BPF:

The number of fins provided in a unit length i.e. the pitch of the coil fins. The smaller the pitch, greater will be the number of fins per unit length coming in direct contact with the air and hence BPF decreases.

The number of rows in a coil in the direction of flow. Higher the number of rows, higher will be the surface area exposed to the air flow. Hence BPF decreases.

7. Write a short note on relative and absolute humidity.

Answer: relative humidity indicates the actual water content of air as a percentage of the maximum amount it could possibly hold.

The term absolute humidity is less common: it describes the actual amount of water vapour in the air in g/m³. This also depends on the temperature of the air.

8. What is transmission gain in respect of cooling load calculation.

Answer: Transmission is heat gain by different partition of the wall in an air conditioned space. It is considered as the sensible heat gain without the direct solar radiation.

$$Q = U A (T_a - T_{rc})$$

Where

- U = coefficient of overall heat transfer between adjacent and conditioned space in Btu/ (h ft² F) See

1997 ASHRAE Fundamentals, Chapter 24 or 2001 ASHRAE Fundamentals, and Chapter 25.

- A = area of partition in ft²

, ceiling or floor calculated from building plans

- T_a = Temperature of adjacent space in °F (Note: If adjacent space is not conditioned and temperature is not available, use outdoor air temperature less 5°F)

- T_{rc} = Inside design temperature of conditioned space in °F (assumed constant)

3. Section C (03 long type questions, each question carries 03 marks)	03×03 = 09
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9. Write a short note on building energy loads.

Answer: Building energy consists of following:

- Thermal Loads.
 - Internal loads: The internal gains from people, lighting and equipment are generally equal to their energy use: when a light fixture converts a watt-hour of electricity into photons, those photons bounce around the room until they get absorbed, turning their light energy into heat energy.
 - External loads:
 - Heat conduction entering or leaving the building envelope to outside air or ground
 - Sunlight (radiant energy) entering through windows to heat interiors or store energy in thermal mass (direct solar gains)
 - Sunlight warming up exterior building surfaces ("indirect solar gains")
 - Losing inside air to the outside, or vice-versa, through leaks and infiltration

10. Explain the role of conduction convection and radiation in building heat load

Answer: Buildings lose sensible heat to the environment (or gain sensible heat from it) in three principal ways:

- 1) Conduction: The transfer of heat between substances which are in direct contact with each other. Conduction occurs when heat flows through a solid.
- 2) Convection: The movement of gasses and liquids caused by heat transfer. As a gas or liquid is heated, it warms, expands and rises because it is less dense resulting in natural convection.
- 3) Radiation: When electromagnetic waves travel through space, it is called radiation. When these waves (from the sun, for example) hit an object, they transfer their heat to that object.

11. Explain the various factors influencing sensible and latent heat in a building to be air conditioned?

Answer: Factors that influence sensible cooling load

- Glass windows or doors
- Sunlight striking windows, skylights, or glass doors and heating the room
- Exterior walls
- Partitions (that separate spaces of different temperatures)
- Ceilings under an attic
- Roofs
- Floors over an open crawl space
- Air infiltration through cracks in the building, doors, and windows
- People in the building
- Equipment and appliances operated in the summer
- Lights

Factors that influence to the latent cooling load: Moisture is introduced into a structure through

- People
- Equipment and appliances
- Air infiltration through cracks in the building, doors, and windows

Ray
John J.



THEORY 1 st - IN-SEM EXAMINATION		
SESSION: 2022-23(SUMMER SEMESTER)		
B.Voc/M.Voc	Semester	5th
Course name / Module	RAC Controls and Building Management System	
Course code	RAC1502	
Date		
Name of the Student	Reg. No.	

INSTRUCTIONS
<ul style="list-style-type: none"> Maximum Marks: 20 Duration of Examination: 01 Hour Attempt all questions.

Answer-sheet

1. Section A (05 objective type questions, each question carries 01 mark)	05×1 = 05
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- Pressure relief falls into which category of valves classification?
 - On-off valve
 - Shut off valve
 - Throttling Valve
 - Function Valve**
- Usually a sensing device is used to compare the actual state (e.g. temperature) with a _____.
 - Room/space conditions
 - Standard condition
 - Target state**
 - Temperature/pressure state
- Thermistors are temperature sensitive _____ that exhibit a large change in resistance over a relatively small range of temperature
 - device
 - resistance bridge
 - semiconductor**
 - Wire
- Relative humidity sensor based on a layer of hygroscopic salt, such as lithium chloride or carbon powder deposited _____.
 - between two layers
 - between two electrodes**
 - in a cell
 - in a resistive bi-metallic strip
- A fixed plate forms one part of the capacitor assembly and a flexible plate is the other part of the capacitor assembly, which type of sensor it can be?

a. Capacitive temperature sensor	b. Capacitive pressure sensor
c. Capacitive humidity sensor	d. Both a and b

Cont..

2. Section B (03 short answer type questions, each question carries 02 marks)	03×02 = 06
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6. What is special purpose valve ?

Answer: Designed for a single application that is outside normal process applications (custom-engineered valves).

Usually handle a demanding temperature, high pressure or a corrosive medium

7. Write a short note on elementary control systems purpose

Answer:

- To provide control of the temperature and/or the humidity in a space
- It also can control the relative pressure between two spaces which helps in preventing the spread of contamination.
- Safety controls prevent the Operation of equipment in an unsafe condition and can trigger visual or audible alarms
- Important function of HVAC control systems is to control the equipment Under part load so that comfort and efficiency are maintained.

8. What is a thermocouple, explain its working principle?

Answer: Thermocouples have two dissimilar metal wires joined at one end.

Temperature differences at the junctions' causes a voltage, in the mill volts (Seebeck Effect)

The output is a voltage proportional to the temperature difference between the junction and the free ends

3. Section C (03 long type questions, each question carries 03 marks)	03×03 = 09
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9. Write a short note on energy sources for control systems.

Answer:

- Electric System: Electric systems provide control by starting and stopping the. flow of electricity or varying the voltage and current using a rheostat or bridge circuits.
- Electronic System: These systems use direct current at low voltages (24 V or less) and currents for sensing and transmission, with amplification by circuits or servo-mechanisms as required for operation of controlled devices.
- Digital System
- Fluidic system
- Hydraulic system
- Self-contained system

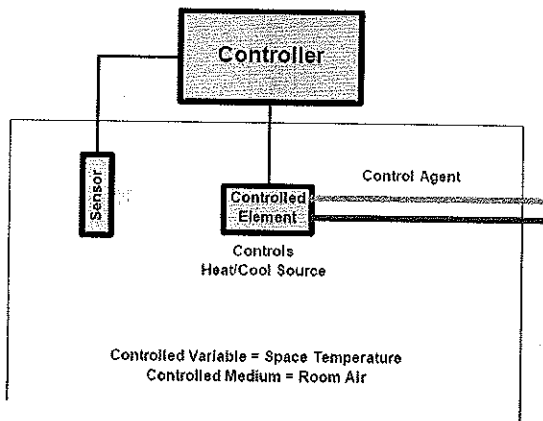
10. Explain the working of a magnetic contactor.

Answer: The working principle of the magnetic contactor is that the main contact is closed due to the coil being energized, and the main contact is disconnected due to the de-energization of the coil.

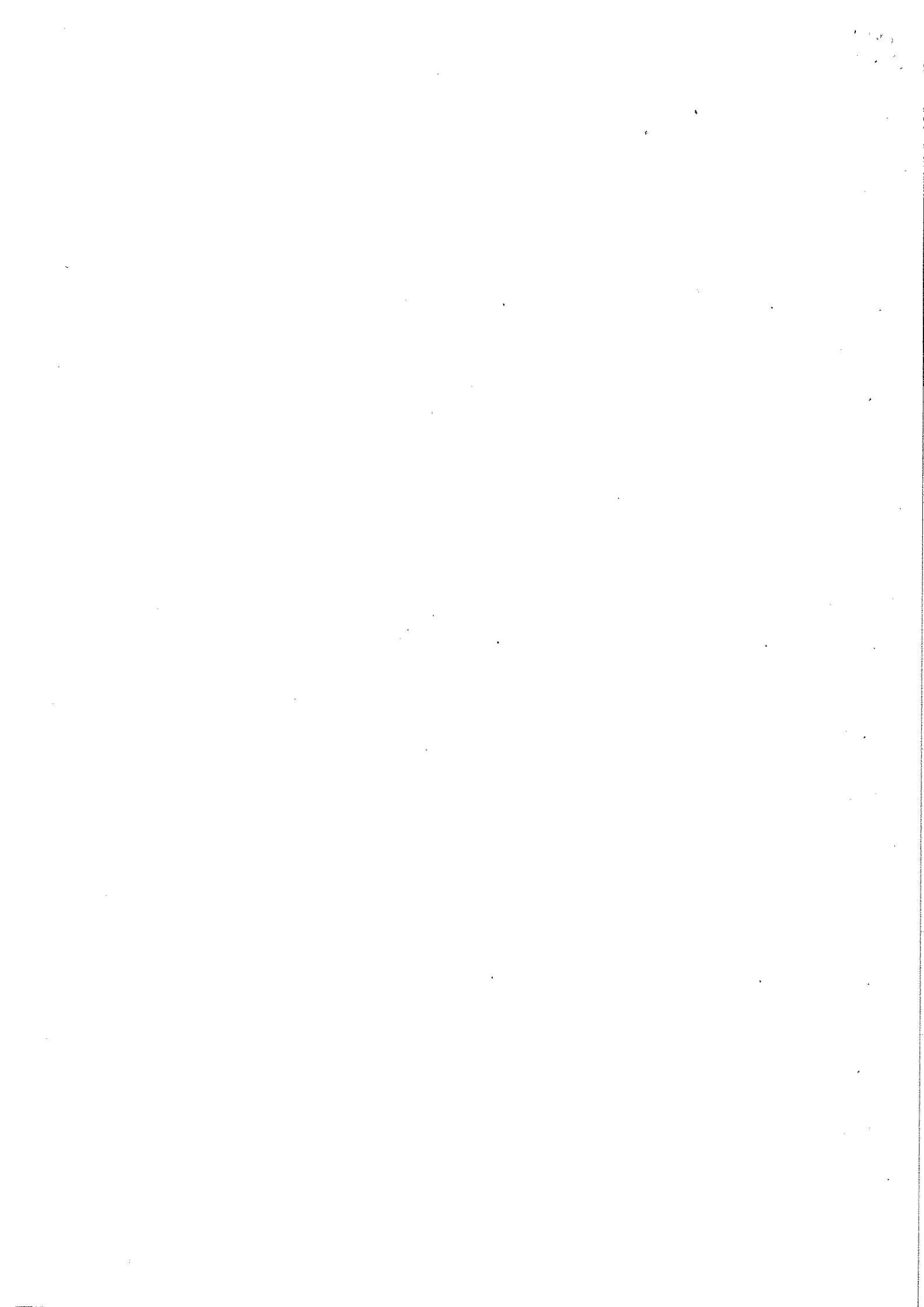
The control circuit is composed of electromagnetic and spring system. The current through the coil activates the magnetism, and the two magnetism approaches each other. This movement shuts off two magnetic forces. Therefore, the contact is closed and the spring provides power to the contact. When the control current is disconnected, the contact is disconnected.

11. Explain the general working of a sensor

Answer: Sensors measure the controlled medium and provide a controller with information concerning changing conditions in an accurate and repeatable manner. The common HVAC variables are temperature, pressure, flow rate and relative humidity.



Boy
ghr





THEORY 1st - IN-SEM EXAMINATION			
SESSION: 2022-23(SUMMER SEMESTER)			
B.Voc	Semester	5th	
Course name / Module	Chilled Water Supply System Design		
Course code	RAC1503		
Date			
Name of the Student		Reg. No.	

Answer Sheet

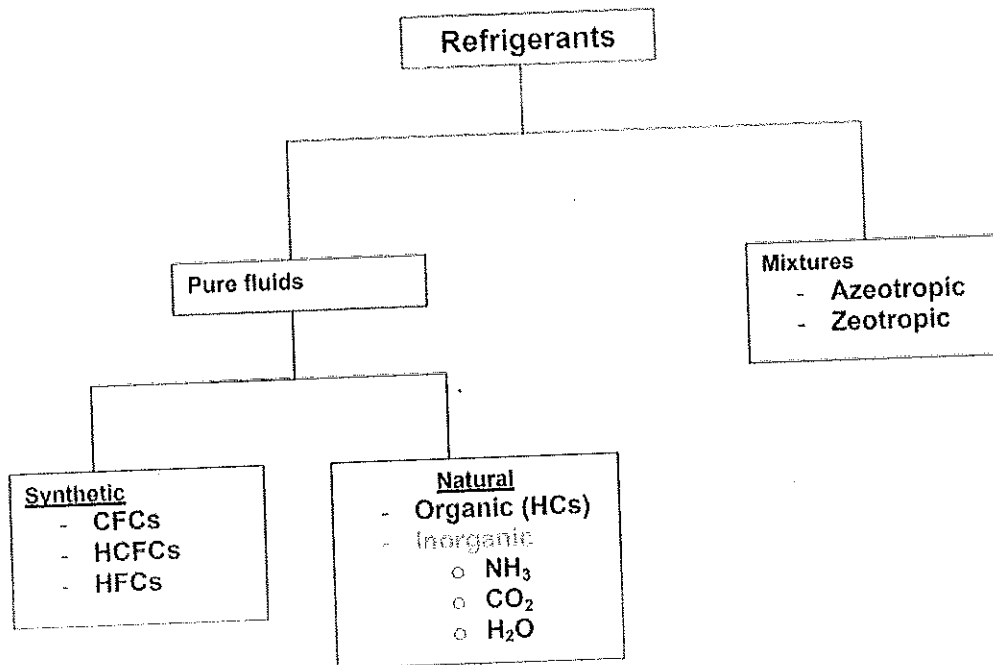
1. Section A (05 objective type questions, each question carries 01 mark)	05×1 = 05
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- Q. 1: B
- Q. 2: D
- Q. 3: A
- Q. 4: C
- Q. 5: A

2. Section B (03 short answer type questions, each question carries 02 marks)	03×02 = 06
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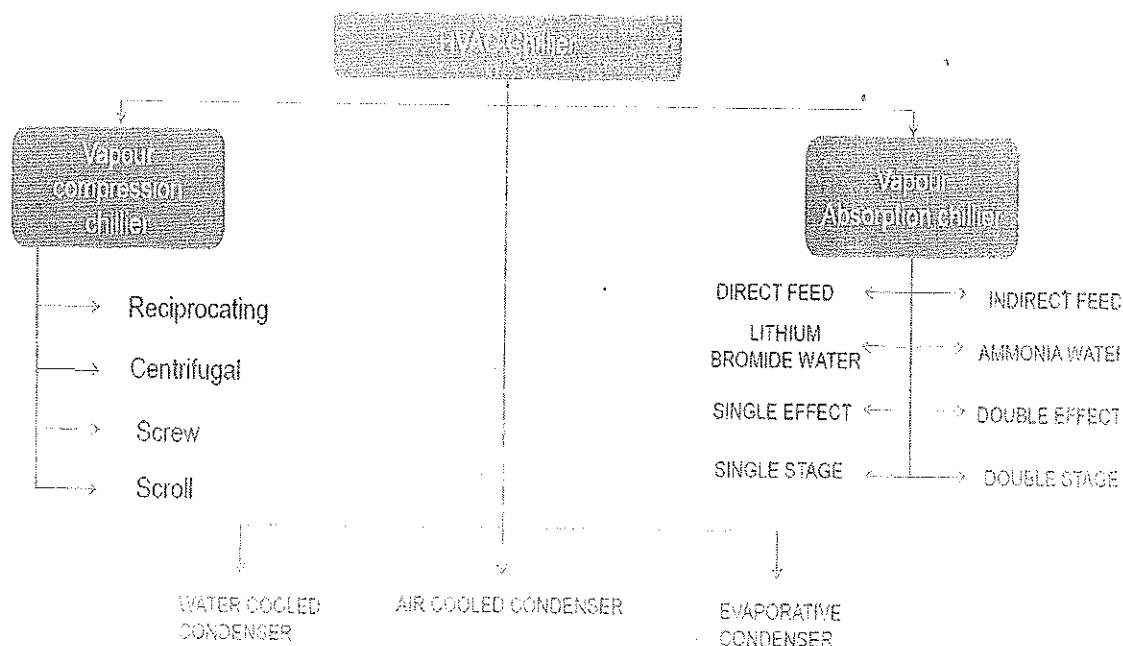
Q. 1: Classified the refrigerants with examples.

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.

3. Section C (03 long type questions, each question carries 03 marks)

03×03 = 09

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.

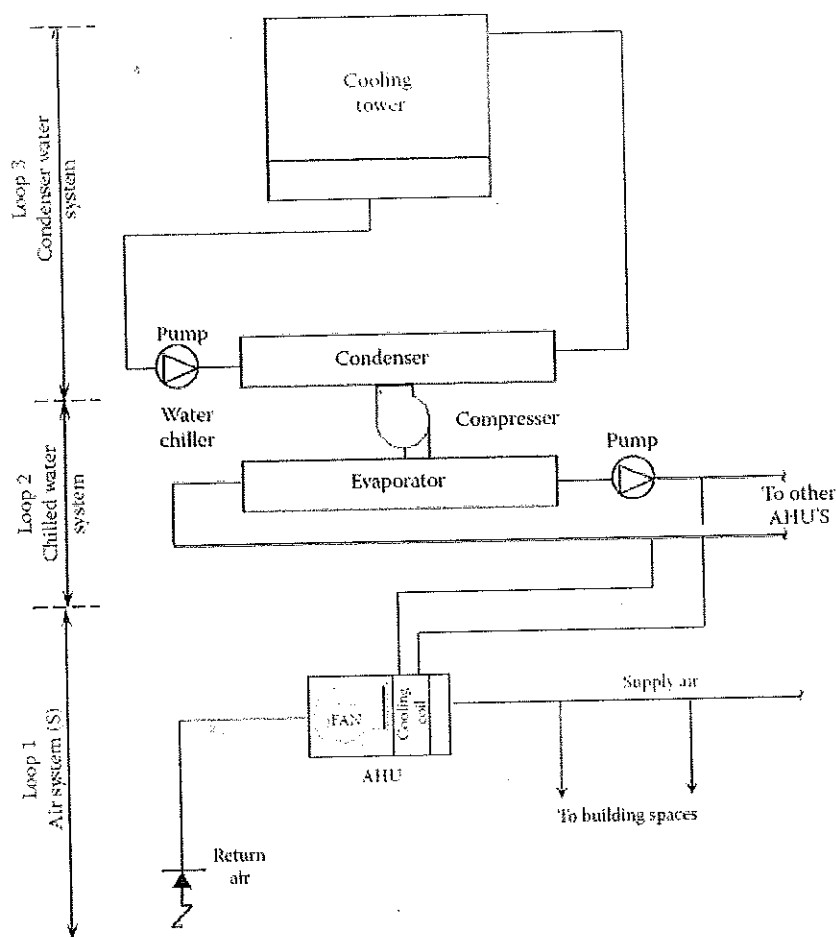


Fig. Water-cooled HVAC system

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

Sheela J...

THEORY 1 st - IN-SEM EXAMINATION (ANSWER SHEET)			
SESSION: 2022-23(SUMMER SEMESTER)			
B.Voc/M.Voc	B. Voc.	Semester	5 th
Course name	AC System & Testing		
Course code	RAC1504		
Date			
Name of the Student		Reg. No.	

1. Section A (05 objective type questions, each question carries 01 mark)	05×1 = 05
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- Who provides the Make up water tank for condenser water?
 - Department
- How many electrical points are supplied by the department?
 - 1
- Whose responsibility is the Safe custody of all machinery and equipment supplied at site?
 - Contractor
- What is the lebeled name for Chilled water?
 - CHW
- Final inspection and testing is done by-.
 - Engineer in charge

2. Section B (03 short answer type questions, each question carries 02 marks)	03×02 = 06
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- Write down the guarantee procedures for machines and equipent installed.
All equipment shall be guaranteed for a period of 12 months from the date of acceptance and taking over of the installation by the Department against unsatisfactory performance and/or breakdown due to defective design, material, manufacture, workmanship or installation. The equipment or component or any part thereof so found defective during the guarantee period shall be repaired or replaced free of cost to satisfaction of Engineer In charge.
- What is a cold storage system?
Initial inspection of materials & equipment at manufacturer's as per details given will be done by the engineer-in-charge or his representative. For item/ equipment requiring initial inspection at manufacturer's works, the contractor will intimate the date of testing of equipment at the manufacturer's works before dispatch.
- Write down the importance of color scheme for equipment.
 - Colour scheme for equipment like chilling unit, pumps, AHUs, cooling tower etc. shall be as per manufacturer's standard colour scheme.
 - The scheme of colour code painting of pipe work services for air conditioning installation shall be as per National building code.

1. Section C (03 long type questions, each question carries 03 marks)
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03×03 = 09

1. Visiting site before tendering is beneficial. How?

The tenderer should, in his own interest, visit the site and familiarise himself with the site conditions before tendering.

For any clarification, tenderer may discuss with the Engineer-in-Charge.

2. Write down the works to be arranged by the department.

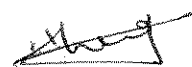
Unless otherwise specified in the tender documents, the following works shall be arranged by the Department:

- (i) Space for accommodating all the equipment and components involved in the work,
- (ii) False ceiling and/ or return air enclosure excluding return air duct wherever provided as required,
- (iii) Make up water tank for condenser water,
- (iv) Power supply, Water supply and Drain points
- (v) Masonry ducts/ service trench within and outside the building for carrying pipe lines and cables wherever specified.
- (vi) If top floor is air conditioned, over-deck insulation.

3. Write down the works to be arranged by the Contractor.

Unless otherwise mentioned in the tender documents, the following works shall be done by the contractor and therefore, their cost shall be deemed to be included in their tendered cost whether specifically indicated in the schedule of work or not: -

- i) Foundations for equipment including foundation bolts and vibration isolation spring/ pads,
- ii) Support columns and beams for cooling towers,
- iii) Suspenders, brackets and floor/ wall supports for suspending/ supporting ducts and pipes,
- iv) Suspenders and/ or cable trays for laying the cables,



Shukla J.