BHARTIYA SKILL DEVELOPMENT UNIVERSITY

Registration No.: .....

School of RAC Skills

Session: 2020-21 (Summer Semester)

B. Voc. Program, 5th Semester,

2nd In-Sem. Examination

Course Code: HVA-1501 **Time: 1 Hour**

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

Instruction: Attempt all questions/ Calculators Are allowed.

SET-A

Section – A

05X01 = 05 Marks

1. The intensity of radiation is given by which law:
    a. Wein's Displacement Law
    b. Planck's Law
    c. Stefan Boltzmann Law
    d. All of the above
2. Thermal radiation emission is proportional to what power of the absolute temperature:
    a. First
    b. Second
    c. Fourth
    d. Third
3. We treat surfaces of a building as:
    a. Gray
    b. Diffused
    c. Gray and Diffused
    d. None of the above
4. The ratio of radiation emitted by a surface to that emitted by an ideal "black" surface at the same temperature is called:
    a. Inductance
    b. Absorptance
    c. Emittance
    d. All of the above
5. Low temperatures will induce
    a. Shorter Wavelengths
    b. Longer Wavelengths
    c. Both A&B
    d. None of the above

Section – B

03X02 = 06 Marks

6. What are the properties of radiation?
7. How do you find out the characteristic Wavelength?
8. What is View factor and how it is calculated?

Section – C

03X03 = 09 Marks

9. A 50 m^2 wall has an air gap separating a layer of brick and a layer of concrete block. At a time when the temperature of the brick surface adjacent to the air gap is –6°C and the temperature of the concrete block surface adjacent to the air gap is 11°C, what is the radiation heat transfer rate across the air gap?
10. Draw the flowchart for RTSM?
11. How do we calculate Sol-air Temperature?

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School of RAC Skills

Session: 2020-21 (Summer Semester)

B. Voc. Program, 5th Semester,

2nd In-Sem. Examination

Course Code: HVA-1501 **Time: 1 Hour**

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

Instruction: Attempt all questions

SET-A

Section – A

05X01 = 05 Marks

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

Section – B

03X02 = 06 Marks

1. Properties of interest include the following:
   - Absorptance, ά the ratio of radiation absorbed by a surface to that incident on the surface.
   - Emittance,ε , the ratio of radiation emitted by a surface to that emitted by an ideal "black" surface at the same temperature
   - Reflectance, ρ, the ratio of radiation reflected by a surface to that incident on the surface
   - Transmittance, τ, the ratio of radiation transmitted by a translucent surface to that incident on the surface
2. The characteristic wavelength is determined by Wein's Displacement Law, which is given by:

$$\lambda = 5216 / T$$

where T is the absolute temperature measured in degrees Rankine R = (F + 460°).

3. As the angle between the hot surface and cold surface decreases, more of the available energy is transferred between the two plates. The maximum radiant heat transfer occurs when the two plates are parallel.
This geometry frequently occurs in buildings (double-pane glazings, hollow core walls, suspended ceilings and roofs, etc.).

Section – C

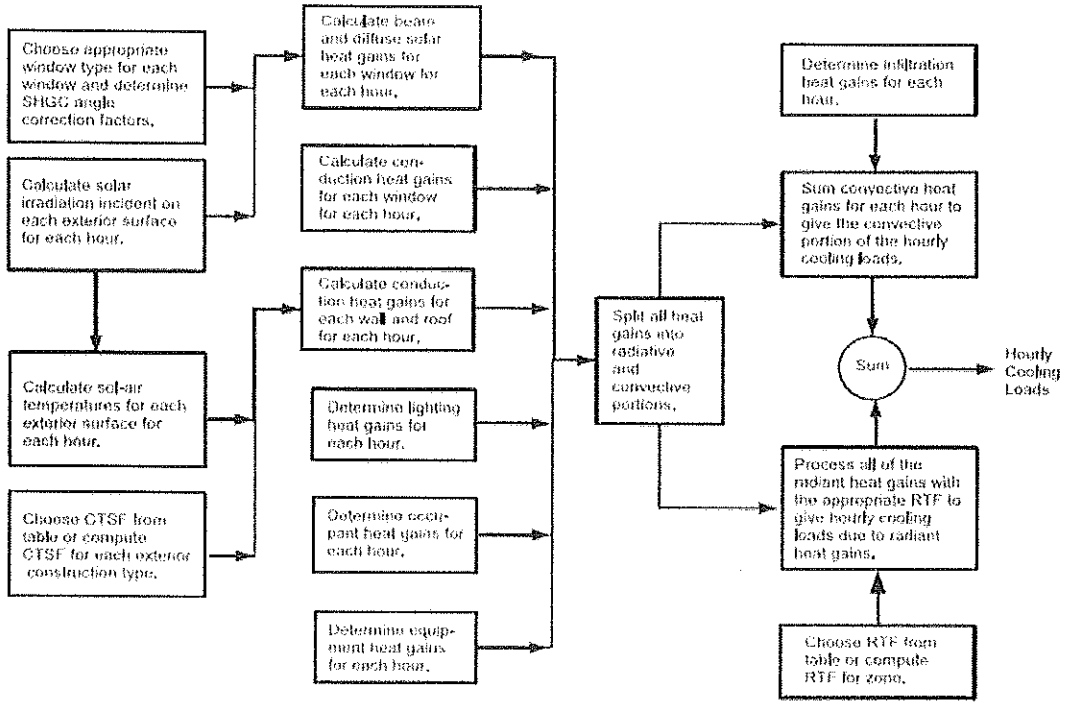
03X03 = 09 Marks

4. $5.68 \times 10^{-8} \quad (284^4 - 267^4) = 6146560000\text{-}5473632256$

$= 672927744$

$= 6.7 \times 10^8$

5.



6. For simplified load calculation procedures, an equivalent air temperature, or the sol-air temperature, is defined that gives approximately the same heat flux to the surface as the combined effects of solar radiation, convection, and radiation to the surroundings. It is given by:

$$t_e = t_o + \alpha G_t / h_o - \varepsilon \delta R / h_o$$

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BHARTIYA SKILL DEVELOPMENT UNIVERSITY

School of RAC Skills

V Semester, 2nd In-Sem. Examination

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

Course Code: HVA1502 **Time: 1 Hour**

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

SET-A

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 purpose of supply chain management is
   a. Provide customer satisfaction
   b. Improve quality of a product
   c. Integrating supply and demand management
   d. Increase production

2. Logistics is the part of a supply chain involved with the forward and reverse flow of
   a. Goods
   b. Services
   c. Cash
   d. All of the above

3. VMI stands for
   a. Vendor material inventory
   b. Vendor managed inventory
   c. Variable material inventory
   d. Valuable material inventory

4. At any point on the saturation curve in psychometric chart, the dry bulb temperature is always
   a. less than the corresponding wet bulb temperature
   b. more than the corresponding wet bulb temperature
   c. equal to the corresponding wet bulb temperature
   d. cannot predict

5. The moisture content lines in psychrometric chart are also called as
   a. relative humidity lines
   b. specific humidity lines
   c. both a. and b.
   d. none of the above

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Section – B

03X02 = 06 Marks

1. Write down the different factors considered for evaporator selection.
2. What is heat rejection ratio?
3. Write down the advantages of forced draft cooling towers.

Section – C

03X03 = 09 Marks

1. How multistage compressors are useful than single stage compressors?
2. Explain the classification of evaporator in detail.
3. How evaporative cooled condenser combines the function of air cooled and water-cooled condenser? Explain in detail.

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School of RAC Skills

V Semester, 2nd In-Sem. Examination

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

ANSWER KEY-A

Course Code: HVA1502 **Time: 1 Hour**

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

Section – A

05X01 = 05 Marks

1. The purpose of supply chain management is
   c. Integrating supply and demand management
2. Logistics is the part of a supply chain involved with the forward and reverse flow of
   d. All of the above
3. VMI stands for
   b. Vendor managed inventory
4. At any point on the saturation curve in psychometric chart, the dry bulb temperature is always
   c. equal to the corresponding wet bulb temperature
5. The moisture content lines in psychrometric chart are also called as
   b. specific humidity lines

Section – B

03X02 = 06 Marks

1. Write down the different factors considered for evaporator selection.

   Answer:

   Heat Transfer

   Materials

   Velocity
2. What is heat rejection ratio?

   Answer: The loading on the condenser per unit of refrigeration is called heat rejection ratio.

   Because Qk = Q0 + *w*, the heat rejection ratio is

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$$\frac{Q_k}{Q_0} = 1 + \frac{W}{Q_0} =$$

Where

Q_k / Q_o = heat rejection ratio

Qk = heat removed in the condenser

$Q0$ = heat load from the evaporator

W = heat equivalent of work from the compressor

$$\text{Heat rejection ratio} = \frac{\text{Heat rejected in the condenser}}{\text{Heat absorbed in the evaporator}}$$

3. Write down the advantages of forced draft cooling towers.

Answer:

1. Forced draft (FD) towers are more efficient than ID draft because some of the air velocity is converted into static pressure in the tower and recovered in the form of useful work.
2. The vibration and noise are minimal because mechanical equipment is set on solid
foundations.
3. Because it handles dry air, problems of blade erosion are avoided.
4. It is safer because it is located on the ground level.

Section – C

03X03 = 09 Marks

1. How multistage compressors are useful than single stage compressors?

When the compression ratio required is considerably high, as in the case of low temperature refrigeration systems, the single-stage compression is highly uneconomical due to the following reasons.

1. Very low volumetric efficiency
2. High frictional losses
3. Leakage problems
4. High running cost

In multistage compression, the compression of refrigerant from initial pressure to final pressure is carried out in more than one cylinder. A multistage

compression with intermediate cooling is generally adopted for economical working.

2. Explain the classification of evaporator in detail.

   Answer: (a) Flooded or Direct Expansion (b) Dry Expansion Evaporators

   In flooded evaporators, the liquid refrigerant covers the entire heat transfer surface. In dry evaporators, a part of the heat transfer surface is used for superheating the vapor. A float valve is used for the expansion of the refrigerant in the case of a flooded evaporator, whereas a thermostatic expansion valve or a capillary tube (in case of small units) is used in conjunction with a dry evaporator. A distinction can also be made on the basis of the flow of refrigerant inside tubes in dry evaporators and outside tubes in flooded evaporators.

   The name direct-expansion is derived from the fact that the refrigerant expands directly inside the tubing and evaporates, thus cooling the medium outside. To facilitate the return of oil to the compressor, D-X evaporators are fed from the top by a thermostatic expansion valve.

3. How evaporative cooled condenser combines the function of air cooled and water-cooled condenser? Explain in detail.

   Answer: The refrigerant first rejects its heat to water and then water rejects its heat to air, mainly in the form of evaporated water. Air leaves with high humidity as in a cooling tower. Thus, an evaporative condenser combines the functions of a condenser and cooling tower. Evaporative condensers are commonly used on large ammonia plants because they are found to be lower in cost. Such condensers require a large amount of the refrigerant charge due to the longer length of the refrigerant piping. Most of the heat given by the refrigerant vapor is carried by air in the form of sensible and latent heat; therefore, the effectiveness of this type of condenser depends upon the wet bulb temperature (WBT) of the incoming air. The capacity of the condenser also depends upon the quantity of air circulated through the condenser, which is limited by the air velocity permitted through the eliminator without carryover of water particles. The quantity of water required for this type of condenser is less than 10% of that required for a wate- cooled condenser.

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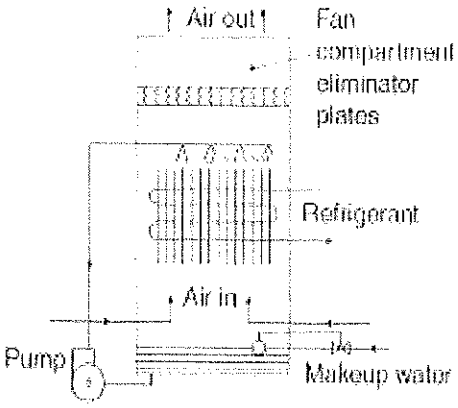


A

BHARTIYA SKILL DEVELOPMENT UNIVERSITY

Registration No.: .....

School of Refrigeration and Air-conditioning Skills

Session: 2020-21 (Summer Semester)

B. Voc. Program, V Semester,

2nd In-Sem. Examination

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

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

Section – A

05X01 = 05 Marks

Note: Each question carries 01 mark.

Q. 1: Efficiency of engine-drive screw chiller is

A. 1.6
B. 1.9
C. 3.25
D. 5.8

Q. 2: Efficiency of Electric-drive air-cooled scroll chiller is

A. 1.6
B. 1.9
C. 3.25
D. 5.8

Q. 3: Chillers operate efficiently in range of

A. 30% to 60% load
B. 40% to 80% load
C. 20% to 50% load
D. 10% to 70% load

Q. 4: Pipe schedule 40 is used for

A. Less than 18-inch pipe size
B. Less than 20-inch pipe size
C. Less than 10-inch pipe size
D. Less than 14-inch pipe size

Q. 5: The wall thickness of copper tubing is indicated by

A. Types K, L, and M
B. Types A, B, and C
C. Types J, K, and L
D. Types D, E, and F

Section – B

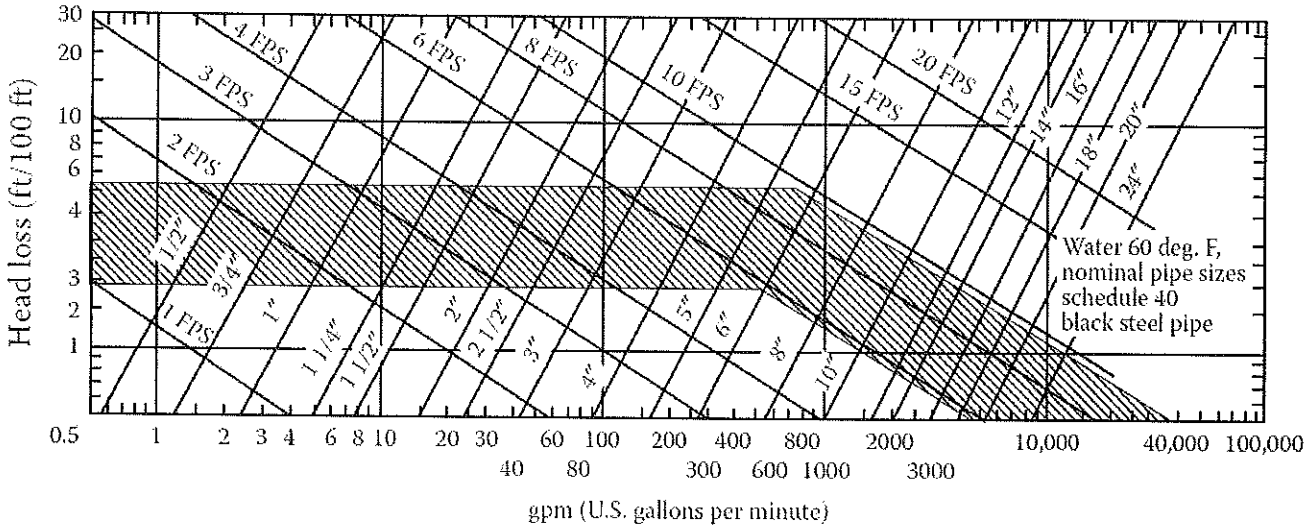
03X02 = 06 Marks

Note: Each question carries 02 mark.

Q. 1: Select the pipe sizes, having minimum and maximum head loss corresponds to 10000 GPM as shown in below figure. Write down head loss values also?

Q. 2: Explain line mounted and base mounted pumps.

Q. 3: What is the difference between symmetrical and asymmetrical chiller?



Section – C

03X03 = 09 Marks

Note: Each question carries 03 mark.

Q. 1: Explain series and parallel chiller system with neat sketch.

Q. 2: Explain engine drive and electric drive chiller system with neat sketch.

Q. 3: Explain primary and secondary parallel configuration with neat sketch.

A

BHARTIYA SKILL DEVELOPMENT UNIVERSITY

Registration No.: .....

School of Refrigeration and Air-conditioning Skills

Session: 2020-21 (Summer Semester)

B. Voc. Program, V Semester,

2nd In-Sem. Examination

Course Code: HVA1503 **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: A
Q. 2: C
Q. 3: B
Q. 4: C
Q. 5: A

Section – B

03X02 = 06 Marks

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

Q. 1: Select the pipe sizes, having minimum and maximum head loss corresponds to 10000 GPM as shown in below figure. Write down head loss values also?

Ans. Pipe size = 24" and head loss – 0.7 ft/100 ft (Minimum head loss)

Pipe size = 12" and head loss – 18 ft/100 ft (Maximum head loss)

Q. 2: Explain line mounted and base mounted pumps.

Ans. Line-mounted pumps: These pumps can be installed directly in the piping since the suction and discharge connections are arranged 180° apart. The motor and pump shafts, typically, are mounted vertically. The pump may be supported by the piping and/or by additional hangers or a foot stand.

Base-mounted pumps: Base-mounted pumps have the motor and pump shafts mounted horizontally, with both the pump and the motor bolted to a common frame or base. These pumps are available in two configurations.

Q. 3: What is the difference between symmetrical and asymmetrical chiller?

Ans. Symmetrical chiller: With this approach, all of the chillers are sized for equal capacity. The number of chillers and, thus, the size of the chiller "module" are based on the minimum anticipated load.

Asymmetrical chiller: There is no engineering rule that says that all chillers in a multichiller system have to be of the same size. While there may be some maintenance advantages (common parts, etc.), different-sized chillers can be operated together.

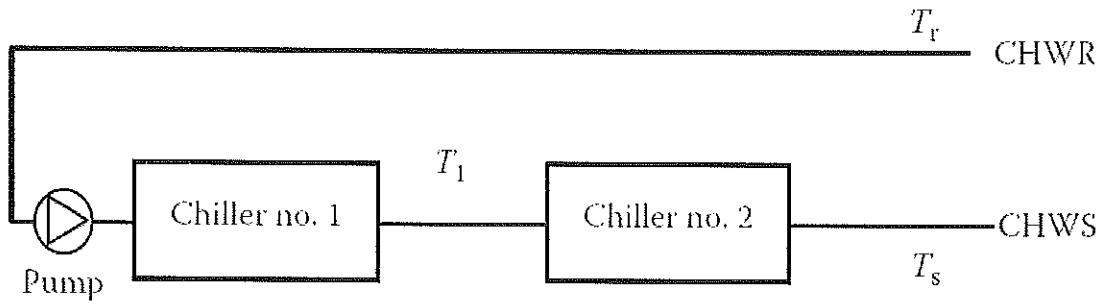
Section – C

03X03 = 09 Marks

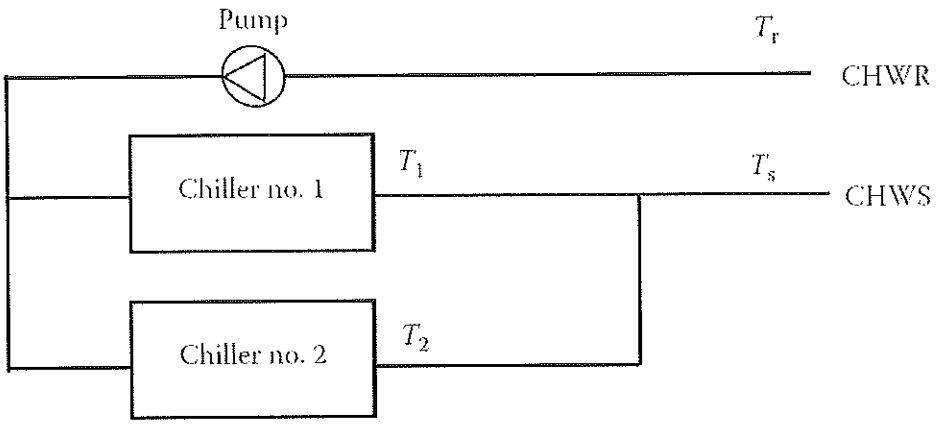
03 essay type questions, each question carries 03 marks.

Q. 1: Explain series and parallel chiller system with neat sketch.

Ans. Series chiller system: In a series configuration with two chillers, each chiller is selected to produce half of the required cooling at the full system flow rate. Thus, half of the total design range is produced by each chiller. Series chiller systems are rarely utilized in present times because this configuration requires a constant chilled water flow rate at all times, resulting in high pumping costs. But, if a relatively large temperature difference is required or if there is a very steady base cooling load, the series configuration may offer some advantages.



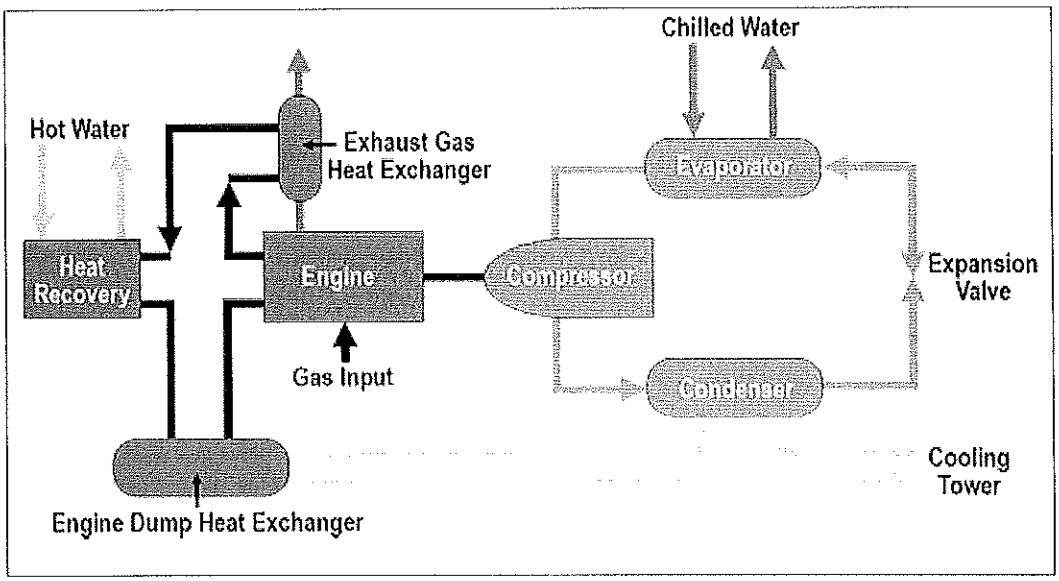
Parallel chiller system: The parallel chiller configuration is far more common. In a two-chiller configuration, each chiller is typically selected to operate with the same design range, but with only a half of the total system flow requirement. This again results in a 50/50 load split, but other load ratios may be selected if dictated by operational requirements. And, there is no real limitation on the number of parallel chillers that can be utilized in one system.



Q. 2: Explain engine drive and electric drive chiller system with neat sketch.

Ans. Electric-drive chillers may be configured as hermetic or open-drive machines. With open-drive chillers, the compressor and motor are separated, with their shafts being connected via a flexible coupling. While in the hermetic configuration, the compressor is rigidly connected directly to the motor shaft, eliminating the need for a flexible coupling.

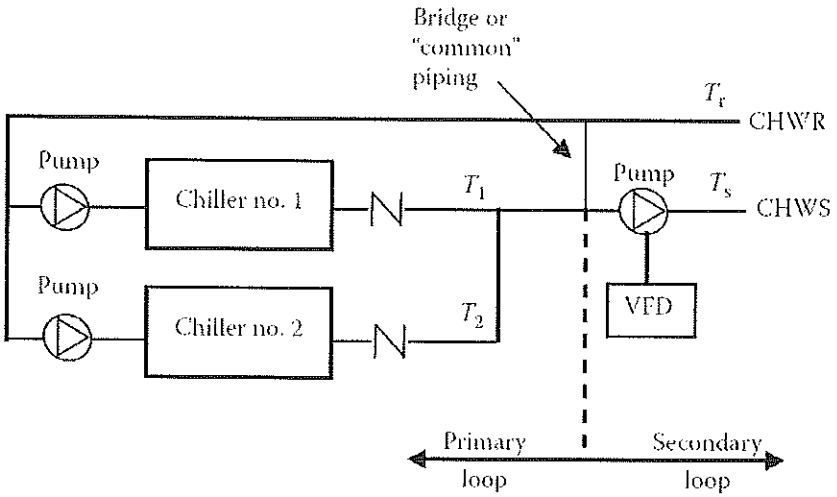
In an open-drive Engine drive configuration, natural gas- and propane-fueled spark ignition engines have been applied to rotary compressor systems. The full-load cooling COPs for engine-drive chillers are ~1.3–1.9 for helical screw compressors and 1.9 for centrifugal compressors. These low COPs can be improved if the engine water jacket heat and exhaust heat can be recovered to heat service hot water or for other uses.



Q. 3: Explain primary and secondary parallel configuration with neat sketch.

Ans. In the primary–secondary variable flow piping arrangement, here, the production loop (primary loop) through the two chillers is hydraulically isolated from the distribution loop (secondary loop) by a piping bridge. The bridge is a short section of piping shared by both loops and designed to have little or no pressure drop. Thus, the flow in one loop is not

affected by flow in the other. On the primary or production loop side, the system acts as multiple-pump parallel chiller installation, as described earlier. Flow in this loop varies in "steps" as the chillers are staged on or off and their respective pumps are started and stopped. However, in the secondary or distribution loop, the cooling coils utilize two-way control valves and the distribution pump(s) utilize a variable frequency drive(s) (VFD) so that the chilled water flow rate is modulated from 0% to 100% of peak design flow as a function of the imposed cooling load. Thus, this loop has fully variable flow, but maintains a constant temperature range.



BHARTIYA SKILL DEVELOPMENT UNIVERSITY

Registration No.: .....

School of Refrigeration & Air conditioning Skills

Session: 2020-21 (Summer Semester)

B. Voc. Program, V Semester,

2st In-Sem. Examination

Time: 1 Hour

Course Code: ~~RAC~~ HVA 1504

Max. Marks: 20

Course Name: AC System & Testing

Instruction: Attempt all.

Section – A

05X01 = 05 Marks

05 objective type questions, each question carries 01 mark.

1._____ Heat load calculation in excel is known as

a) E-20 form
b) B.O.Q
c) R.F.I
d) HLC HAP

2._____ force is responsible for the body under rotation to be in circular motion

a) Centrifugal
b) Centripetal
c) Rotational motion
d) Normal force

3. Chiller can be classified based on application as_____

a) Process and Comfort Chiller
b) Power Chiller
c) Screw Chiller
d) Absorption Chiller

4. NBC stands for _____

a) National boiler codes
b) National BIM Codes
c) National bureau of standard
d) National building codes

5. compressor with screws are known as_____.

a) Positive displacement
b) Dynamic compressor
c) Roto compressor

d) Linear

Section – B

03X02 = 06 Marks

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

1.What are the types of compressor used in central plant (Chiller)?

2. With a neat diagram explain the Scroll compressor.

3.Types of evaporator used in chillers with diagram?

Section – C

03X03 = 09 Marks

03 essay type questions, each question carries 03 marks.

1.Name the Types of fitting in a duct along with?

Calculation for reducer Length Duct of size 32"X22" to a duct of 22"X 22"

Dimensions are in inches

2. Explain briefly with a neat diagram About screw Compressor?

3. Limitation and advantages of Scroll and reciprocating Compressor?

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Registration No.: .....

School of Refrigeration & Air conditioning Skills

Session: 2020-21 (Summer Semester)

B. Voc. Program, V Semester,

2st In-Sem. Examination

Course Code: RAC 1504 **Time: 1 Hour**

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

Instruction: Attempt all.

ANSWER KEY

Section – A

05X01 = 05 Marks

05 objective type questions, each question carries 01 mark.

1. a) E-20 form
2. a) Centrifugal
3. a) Process and Comfort Chiller
4. d) National building codes
5. a) Positive displacement

Section – B

03X02 = 06 Marks

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

1.What are the types of compressor used in central plant (Chiller)?

Reciprocating Compressors

Reciprocating compressors use a piston and cylinder to compress incoming refrigerant. As the piston moves downward, refrigerant is drawn into the cylinder. The piston then moves upwards compressing the refrigerant and discharging it downstream to the condenser. Intake and exhaust valves ensure that the refrigerant does not flow backwards.

Centrifugal Compressor Rotary vane compressors typically are quieter than other options. They consist of vanes or blades that are attached to a core rotor. The rotor is positioned off-centre within its cylinder, creating multiple areas of varying sizes.

Scroll compressors work by compressing the refrigerant between two spiral plates, one stationary and one orbiting.

Screw Rotary screw compressors have two interlocking helical rotors mounted inside a casing. As the rotors turn, the gas is forced from the suction end of the casing to the discharge end. The available space between the rotors and the casing becomes increasingly smaller as the gas moves along the length of the screw, increasing the pressure.

Answer 2

SCROLL COMPRESSOR FUNCTIONAL DESCRIPTION

Key Components

1. Discharge plenum
2. Discharge tube
3. Pressure relief valve
4. Fixed scroll
5. Orbiting scroll
6. Terminal cover
7. Power terminal
8. Counterweight
9. Eccentric Shaft
10. Lower bearing
11. Thrust washer
12. Oil tube
13. Lower bearing ring
14. Shell
15. Stator
16. Rotor
17. Crankcase
18. Slider block
19. Thermal valve
20. Check valve

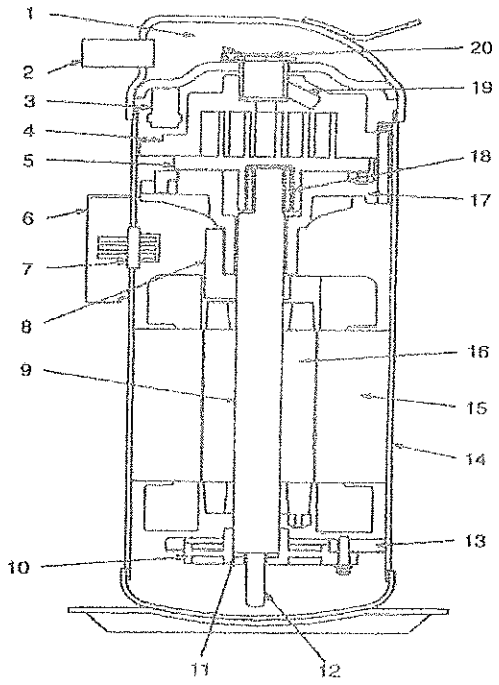


Figure 1-1

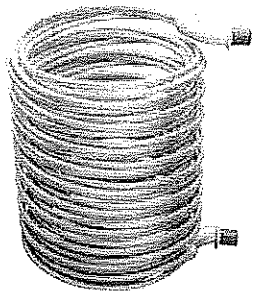
Scroll type compressor are mostly silent working as no of assemblies are very low and they are highly process efficient high discharge low maintenance.

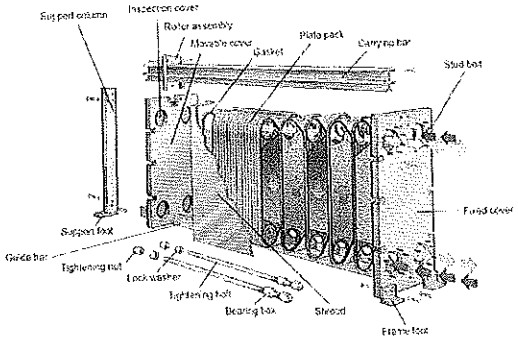
3.Types of evaporator used in chillers with diagram?

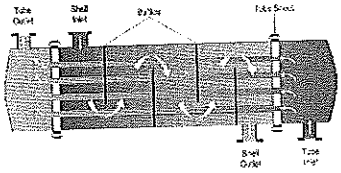
1.Shell Type-Used where the load is low with space constrain spiral tube in form of coil is shaped to cool the secondary refrigerant

2.Plate heat exchanger type- here two concentric plates are sandwiched between the tube where aluminum plates used as a fin to increase area for heat transfer

3.Flooded shell and tube- here tubes carry refrigerant or secondary refrigerant and as per the application shell part are exposed to these number of tubes for better heat transfer coefficient.







Section – C

03X03 = 09 Marks

03 essay type questions, each question carries 03 marks.

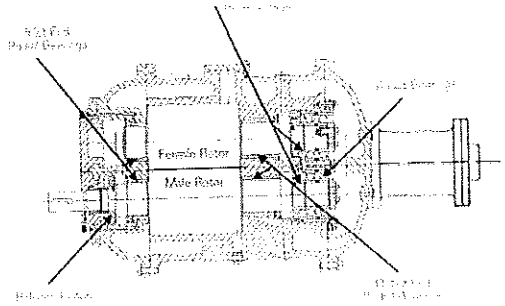
1.The Types of fitting in a duct- Reducers enlarger Elbow with

Short and long radius tees, taps, takeoff

Calculation for reducer Length Duct of size 32"X22" to a duct of 22"X 22"

= reducer length WHEN Width changes = 32-22/2*5 =25 INCH

2. Explain briefly with a neat diagram About screw Compressor?



Screw Rotary screw compressors have two interlocking helical rotors mounted inside a casing. As the rotors turn, the gas is forced from the suction end of the casing to the discharge end. The available space between the rotors and the casing becomes increasingly smaller as the gas moves along the length of the screw, increasing the pressure.

3. Limitation and advantages of Scroll and reciprocating Compressor?

Advantages include:	Disadvantages include:
• Small size and weight • Generally, can be located close to point-of-use avoiding lengthy piping runs and pressure drops • Do not require separate cooling systems • Simple maintenance procedures.	• Lubricant carryover as piston rings wear which should be avoided • Relatively high noise • Relatively high cost of compression • Generally, are designed to run not more

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School of Refrigeration & Air conditioning Skills

Session: 2020-21 (Summer Semester)

B. Voc. Program, V Semester,

2st In-Sem. Examination

Course Code: ~~RAC~~ HVA 1504 **Time: 1 Hour**

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

Instruction: Attempt all.

Section – A

05X01 = 05 Marks

05 objective type questions, each question carries 01 mark.

1._____ Heat load calculation in excel is known as

a) E-20 form
b) B.O.Q
c) R.F.I
d) HLC HAP

2. BIS-277 is for _____

a) Sheet Metal Specification (GI).
b) BIS-655 Sheet Metal Fabrication and Erection Installation (GI).
c) Sheet Metal Work Safety Standards.
d) DUCT WORK

3. Chiller can be classified based on application as_____

a) Process and Comfort Chiller
b) Power Chiller
c) Screw Chiller
d) Absorption Chiller

4. Fire dampers are certified by

a) Under writer's laboratory
b) Ashrae
c) Ishrae
d) Duct work

5. Nacph for a room with dimensions 15'X12X10 for a 1 Minutes will be_____.

a) 13
b) 30
c) 52
d) 70

Section – B

03X02 = 06 Marks

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

1.What are the types of compressor used in central plant (Chiller)?

2. Difference between F.CU and A.H.U List any three?

3.Types of evaporator used in chillers with diagram?

Section – C

03X03 = 09 Marks

03 essay type questions, each question carries 03 marks.

1.Name the Types of fitting in a duct along with?

Calculation for reducer Length Duct of size 32"X22" to a duct of 22"X 22"

Dimensions are in inches

2. With a neat diagram explain the Scroll compressor.

3.Using the continuity equation calculate the sizes of duct?

Take Q=AV where Q/V as constant

1) 36 sq ft 2) 169 sq inches equivalent rectangular sizes?

B

BHARTIYA SKILL DEVELOPMENT UNIVERSITY

Registration No.: .....

School of Refrigeration & Air conditioning Skills

Session: 2020-21 (Summer Semester)

B. Voc. Program, V Semester,

2st In-Sem. Examination

Course Code: HVA 1504 **Time: 1 Hour**

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

Instruction: Attempt all.

ANSWER KEY B

Section – A

05X01 = 05 Marks

05 objective type questions, each question carries 01 mark.

1. a) E-20 form

2. a) Sheet Metal Specification (GI).

3. a) Process and Comfort Chiller

4. a) Under writer's laboratory

5. b)30

Section – B

03X02 = 06 Marks

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

1.What are the types of compressor used in central plant (Chiller)?

Reciprocating Compressors

Reciprocating compressors use a piston and cylinder to compress incoming refrigerant. As the piston moves downward, refrigerant is drawn into the cylinder. The piston then moves upwards compressing the refrigerant and discharging it downstream to the condenser. Intake and exhaust valves ensure that the refrigerant does not flow backwards.

Centrifugal Compressor Rotary vane compressors typically are quieter than other options. They consist of vanes or blades that are attached to a core rotor. The rotor is positioned off-centre within its cylinder, creating multiple areas of varying sizes.

Scroll compressors work by compressing the refrigerant between two spiral plates, one stationary and one orbiting.

Screw Rotary screw compressors have two interlocking helical rotors mounted inside a casing. As the rotors turn, the gas is forced from the suction end of the casing to the discharge end. The available space between the rotors and the casing becomes increasingly smaller as the gas moves along the length of the screw, increasing the pressure.

2.

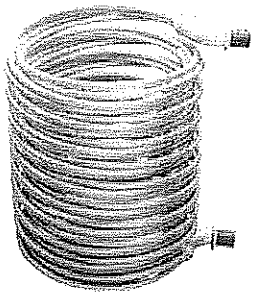
AHU'S	FCU'S
AHU's are often used outside, especially as rooftop units	FCU's have only one fan, whereas AHU's can have multiple fans
AHU's often have different controls for parts of the system, for instance they might have temperature sensors, actuators, and humidity sensors.	FCU's are generally used for controlling the space where they are installed. AHU's are part of a larger system.
AHU's are more complex and can have sections for humidifying and reheating. They often have vibration isolators, mixing chambers, and other components. Since they often take air from outside, they almost always have a filter of some sort in the first section of the device so that the debris from the air doesn't contaminate the other sections.	FCU's don't generally use ductwork to cool or heat air. The fan pulls the air over the coil. FCU's can handle water.

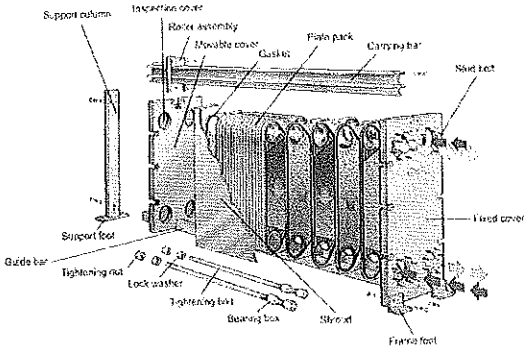
3.Types of evaporator used in chillers with diagram

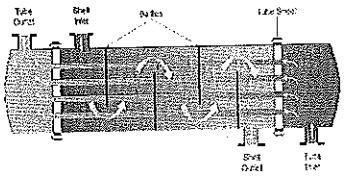
1.Shell Type-Used where the load is low with space constrain spiral tube in form of coil is shaped to cool the secondary refrigerant

2.Plate heat exchanger type- here two concentric plates are sandwiched between the tube where aluminum plates used as a fin to increase area for heat transfer

3.Flooded shell and tube- here tubes carry refrigerant or secondary refrigerant and as per the application shell part are exposed to these number of tubes for better heat transfer coefficient.







Section – C

03X03 = 09 Marks

03 essay type questions, each question carries 03 marks.

1.The Types of fitting in a duct- Reducers enlarger Elbow with

Short and long radius tees, taps, takeoff

Calculation for reducer Length Duct of size 32"X22" to a duct of 22"X 22"

= reducer length WHEN Width changes = 32-22/2*5 =25 INCH

2. Answer 2

Scroll type compressor are mostly silent working as no of assemblies are very low and they are highly process efficient high discharge low maintenance.

SCROLL COMPRESSOR FUNCTIONAL DESCRIPTION

Key Components

1. Discharge plenum
2. Discharge tube
3. Pressure relief valve
4. Fixed scroll
5. Orbiting scroll
6. Terminal cover
7. Power terminal
8. Counterweight
9. Eccentric Shaft
10. Lower bearing
11. Thrust washer
12. Oil tube
13. Lower bearing ring
14. Shell
15. Stator
16. Rotor
17. Crankcase
18. Slider block
19. Thermal valve
20. Check valve

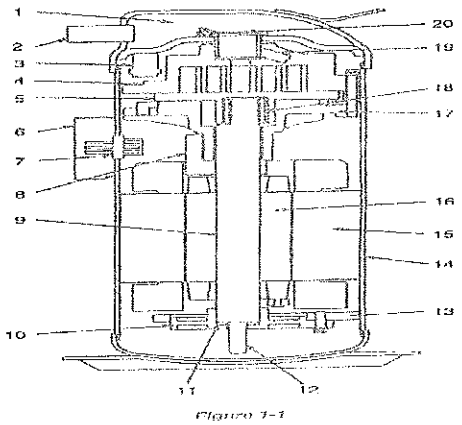


Figure 7-1

3. Using the continuity equation calculate the sizes of duct

36 sq ft, 36 = 6'X6' Q=AV = Q/V= AREA ft under root of WILL BE 6'*6'

169 sq inches =13"X13" Inches