BHARTIYA SKILL DEVELOPMENT UNIVERSITY

Registration No.: .....

School of RAC Skills

Session: 2021-22 (Summer Semester)

B. Voc. 1st Semester,

End-Sem. Examination

Time: 2 Hour

Max. Marks: 50

Course Code: RAC1101

Course Name: Basic of RAC

Instruction: Write both the answer and option in section A.

Section – A

01X10 = 10 Marks

1. _____ indicates the average velocity of the molecules of the substance
   a. Heat
   b. enthalpy
   c. Temperature
   d. Entropy

2. What is the one ton of refrigeration means
   a. Capacity of 1 tonne water to be heated to 0C in 24 hours
   b. Capacity of 1 tonne water to be heated to 0C in 24 hours
   c. Capacity of 1 tonne ice to be cooled to 0C in 24 hours
   d. Capacity of 1 tonne water to be cooled to 0C in 24 hours

3. What is the COP of the system if the work input is 40Kj/kg and work output is 80Kj/kg and refrigeration effect produced is 130 Kj/Kg of the refrigerant flow
   a. 2.25
   b. 3.25
   c. 4.25
   d. 5

4. Condenser and evaporator temperature are 312 K and _____K and COP is 5.
   a. 65
   b. 52
   c. 82
   d. 40

5. COP of the heat pump is always _____
   a. Positive number
   b. Greater than zero
   c. Greater than one
   d. Can be anything

6. COP of a refrigerator is 5 what will be the ratio of highest temperature to lowest temperature.
   a. 0.8
   b. 1.7
   c. 1.2
   d. 2.3

7. Any operation in which one or more properties of a system changes is called a change of _____

   a. State.
   b. Properties
   c. Enthalpy
   d. COP

8. What is the value of 110 Celsius in Fahrenheit scale?

   a. 178
   b. 190
   c. 230
   d. 240

9. The process in which system and surroundings can be restored to the initial state from the final state without producing any changes in their thermodynamic properties.

   a. Constant Enthalpy process
   b. Constant Entropy process
   c. Reversible process
   d. irreversible process

10. 1 TR = _____Kj/s

    a. 2.5
    b. 3.5
    c. 3
    d. 4

Section – B

04X04 = 16 Marks

11. Explain the first law of thermodynamics.
12. Explain internal energy and energy in transit.
13. Define enthalpy and entropy.
14. COP of a system is 3 and T_H is 150 Fahrenheit, find the T_L of the system in Kelvin.

Section – C

04X06 = 24 Marks

15. What are various intensive properties and extensive properties explained with examples?
16. Explain the thermodynamic equilibrium.
17. What are reversible and irreversible processes?
18. Find the heat rejected by a refrigeration system to change the temperature of 20 kg water from -20 to 20 degree Celsius.

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Course Code: RAC1101 **Time: 2 Hour**

Course Name: Basic of RAC **Max. Marks: 50**

Instruction: Write both the answer and option in section A.

Set A

Answer sheet

Section – A

01X10 = 10 Marks

1. _____ indicates the average velocity of the molecules of the substance

   c. Temperature

2. What is the one ton of refrigeration means

   d. Capacity of 1 tonne water to be cooled to 0C in 24 hours

3. What is the COP of the system if the work input is 40Kj/kg and work output is 80Kj/kg and refrigeration effect produced is 130 Kj/Kg of the refrigerant flowing.

   b. 3.25

4. Condenser and evaporator temperature are 312 K and _____K and COP is 5.

   b. 52

5. COP of the heat pump is always _____

   c. Greater than one

6. COP of a refrigerator is 5 what will be the ratio of highest temperature to lowest temperature.

   c. 1.2

7. Any operation in which one or more properties of a system changes is called a change of _____

   a. state.

8. What is the value of 110 Celsius in Fahrenheit scale?

   c. 230

9. The process in which system and surroundings can be restored to the initial state from the final state without producing any changes in their thermodynamic properties.

   c. Reversible process

10. 1 tonn = _____Kj/s

b. 3.5

Section – B

04X04 = 16 Marks

11. Explain the first law of thermodynamics.

Answer: First Law of Thermodynamics Equation

The equation for the first law of thermodynamics is given as;

$\Delta U = q + W$

Where,

ΔU = change in internal energy of the system.

q = algebraic sum of heat transfer between system and surroundings.

W = work interaction of the system with its surroundings.

12. Explain internal energy and energy in transit.

Answer: Heat transfer and work are both energy in transit—neither is stored as such in a system. However, both can change the internal energy U of a system. Internal energy is a form of energy completely different from either heat or work.

13. Define enthalpy and entropy.

Answer: Enthalpy is the amount of internal energy contained in a compound whereas entropy is the amount of intrinsic disorder within the compound. Enthalpy is zero for elemental compounds such hydrogen gas and oxygen gas; therefore, enthalpy is nonzero for water (regardless of phase). Entropy, or the amount of disorder, is always highest for gases and lowest for solids. This is because gas molecules are widely spread out and, therefore, are more disordered than solids and liquids. Hydrogen gas will have a higher entropy than liquid water.

14. COP of a system is 3 and T_H is 150 Fahrenheit, find the T_L of the system in Kelvin.

Answer: COP = low temp/ (high temp – low temp)

3 = low temp/ (high temp – low temp)

3 x high temp = 4 low temp

Low temp = ¾ x high temp

Low temp = ¾ x 150 = 112.5 = 318 K

Section – C

04X06 = 24 Marks

15. What are various intensive properties and extensive properties explained with examples.

Answer: An extensive property is a property that depends on the amount of matter in a sample. The mass of an object is a measure of the amount of matter that an object contains. A small sample of a certain type of matter will have a small mass, while a larger sample will have a greater mass.

An intensive property is a property of matter that depends only on the type of matter in a sample and not on the amount. Other intensive properties include color, temperature, density, and solubility.

16. Explain the thermodynamic equilibrium.

- **Answer:** *MECHANICAL EQUILIBRIUM:* In absence of any unbalance force within the system itself and also between the system and surroundings.
- *CHEMICAL EQUILIBRIUM:* If there is no chemical reaction or transfer of matter from one part of the system to another.
- *THERMAL EQUILIBRIUM:* if there is no temperature difference within the system and between the system and surroundings.

17. What are reversible and irreversible processes?

Answer: A reversible process is a process in which the system and environment can be restored to exactly the same initial states that they were in before the process occurred, if we go backward along the path of the process.

An irreversible process is what we encounter in reality almost all the time. The system and its environment cannot be restored to their original states at the same time. Because this is what happens in nature, it is also called a natural process. The sign of an irreversible process comes from the finite gradient between the states occurring in the actual process.

18. Find the heat rejected by a refrigeration system to change the temperature of 20 kg water from -20 to 20 degree Celsius.

Answer: q = (m Cp delta T) + (m x L) + (m Cp delta T)
q = (20 * 4.2 * 20) + (20 * 334) + (20 * 4.18 * 20)
Q = 10032kJ
Q= 2.78 Watt

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Course Name: Basic of RAC **Max. Marks: 50**

Instruction: Write both the answer and option in section A.

Set B

Section – A

01X10 = 10 Marks

1. _____ is the pull of the Earth on an object?
   a. Weight
   b. Specific gravity
   c. Gravity
   d. Density
2. _____Cause an increase in molecular motion?
   a. Radiation
   b. Sensible heat
   c. Pressure Drop
   d. Freezing
3. The_____ is the temperature at which the vapor pressure of liquid equals the external pressure surrounding the liquid.
   a. Critical point
   b. Boiling point
   c. both a and b
   d. none of above
4. System and surrounding are separated by _____?
   a. Boundary
   b. Fence
   c. Power
   d. Border
5. Any operation in which one or more properties of a system changes is called a change of _____
   a. state.
   b. mass
   c. entropy
   d. properties
6. When the path is completely specified, the change of state is called a _____.
   a. process
   b. changed state
   c. point function
   d. all of above
7. The process in which system and surrounding can be restored to the initial state from the final state without producing any changes in their thermodynamic properties.
   a. Constant pressure process
   b. Constant volume process

c. Reversible process
d. all of above

8. Work is said to be done by a system if the sole effects on things external to the system can be reduced to _____ of a weight.

a. lifting
b. Reducing
c. lowering
d. Increasing

9. _____ indicates the average velocity of the molecules of the substance

a. Density
b. Weight
c. Temperature
d. Pressure

10. 1 Pascal is = 1 _____

a. N.M
b. N/M^2
c. $N.M^3$
d. NM^2

Section – B

04X04 = 16 Marks

11. What are various intensive properties explained with examples.
12. Explain the chemical equilibrium.
13. What are reversible processes?
14. COP of a system is 3 and T_H is 150 Fahrenheit, find the T_L of the system in Kelvin.

Section – C

04X06 = 24 Marks

15. Explain the first and Zeroth law of thermodynamics.
16. Explain internal energy and energy in transit.
17. Explain pressure enthalpy chart.
18. Find the heat rejected by a refrigeration system to change the temperature of 40kg water from -10 to 30 degree Celsius.

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B. Voc. Ist Semester,

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Course Code: RAC1101 **Time: 2 Hour**

Course Name: Basic of RAC **Max. Marks: 50**

Instruction: Write both the answer and option in section A.

Set B

Answer sheet

Section – A

01X10 = 10 Marks

1. _____ is the pull of the Earth on an object?

   c. Gravity

2. _____Cause an increase in molecular motion?

   b. Sensible heat

3. The_____ is the temperature at which the vapor pressure of liquid equals the external pressure surrounding the liquid.

   b. Boiling point

4. System and surrounding are separated by _____?

   a. Boundary

5. Any operation in which one or more properties of a system changes is called a change of _____.

   a. state.

6. When the path is completely specified, the change of state is called a _____.

   a. process

7. The process in which system and surrounding can be restored to the initial state from the final state without producing any changes in their thermodynamic properties.

   c. Reversible process

8. Work is said to be done by a system if the sole effects on things external to the system can be reduced to _____ of a weight.

   a. lifting

9. _____ indicates the average velocity of the molecules of the substance

   c. Temperature

10. 1 Pascal is = 1 _____

    b. N/M^2

Section – B

04X04 = 16 Marks

11. What are various intensive properties explained with examples.

    Answer: An intensive property is a property of matter that depends only on the type of matter in a sample and not on the amount. Other intensive properties include color, temperature, density, and solubility.

12. Explain the chemical equilibrium.

    Answer: chemical equilibrium, condition in the course of a reversible chemical reaction in which no net change in the amounts of reactants and products occurs. A reversible chemical reaction is one in which the products, as soon as they are formed, react to produce the original reactants. At equilibrium, the two opposing reactions go on at equal rates, or velocities, and hence there is no net change in the amounts of substances involved

13. What are reversible processes?

    Answer: A reversible process is one which can be taken from its initial state to another state, and then back to the initial state without any change to either the system or the surroundings. Examples of these are the following:

    - frictionless motion of solids (no friction between mating surfaces)
    - extension of springs (no hysteresis losses in the materials)
    - slow adiabatic compression or expansion of gases (so that no pressure waves are set up in the gas)

14. COP of a system is 3 and T_H is 100 Fahrenheit, find the T_L of the system in Kelvin.
15. **Answer:** COP = low temp/ (high temp – low temp)
16. 3 = low temp/ (high temp – low temp)
17. 3 x high temp = 4 low temp
18. Low temp = ¾ x high temp
19. Low temp = ¾ x 100 = 112.5 = 297 K

Section – C

04X06 = 24 Marks

20. Explain the first and zeroth law of thermodynamics.

    Answer: Law of conservation of energy: the energy can neither be created nor destroyed but only can be converted from one form to another. For a closed system undergoing a cycle it was found,

    $\oint 1W = J \oint 1Q$, Where J is joule's equivalent constant.

Cyclic integral of work done (W) = Cyclic integral of heat (Q)

In SI units J = 1 Nm/Joule

Zeroth law of thermodynamics: When a body A is in thermal equilibrium (same temperature) with a body B and separately with a body C, then B and C will be in thermal equilibrium with each other.

21. Explain internal energy and energy in transit.

Answer: Work and heat interactions are the forms of energy in transit, observed at boundaries. Internal energy is the energy in storage.

Macroscopic energy mode: includes macroscopic kinetic and potential energy.

Microscopic energy mode: refers to the energy stored in molecular and atomic structure of the system and known as molecular internal energy or simply internal energy.

So the total energy E,

$$E = E_{(kinetic)} + E_{(potential)} + U$$

$$\text{macro} \qquad \text{micro}$$

In absence of motion and gravity, $Q = U + W$

22. Explain Pressure Enthalpy chart with a neat diagram.

Answer: A log P/h diagram, and indicates the refrigerant's various thermodynamic states. This diagram can be seen as a map of the refrigerant. The area above and to the left of the saturation line for liquid is the area where the refrigerant is sub-cooled, i.e. the temperature is lower than the saturation temperature for the pressure range in question. The area above and to the right of the saturation line for gas) is the area where the gas is superheated, or overheated, i.e. the gas has a higher temperature than the saturation temperature at that pressure. The area below the saturation lines for liquid and gas) represents the conditions where the refrigerant can change its state of aggregation from liquid to gas or vice versa. Hence, there is a mixture of gas and liquid.

23. Find the heat rejected by a refrigeration system to change the temperature 40kg of water from 30 to -10 degree Celsius.

Answer: q = (m Cp delta T) + (m x L) + (m Cp delta T)

Q = (40 * 4.2 * 30) + (40 * 334) + (40 * 4.18 * 10)

Q = 20072kJ

Q= 5.57 Watt

BHARTIYA SKILL DEVELOPMENT UNIVERSITY

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School of Refrigeration & Air Conditioning Skills

Session: 2021-22 (Summer Semester)

B. Voc. Program, I Semester,

End-Sem. Examination

Course Code: RAC1102 **Time: 2 Hours**

Course Name: Domestic RAC Appliances **Max. Marks: 50**

SET-A

Instruction:

All questions are compulsory.

Section A is objective type.

Section B is short answer type.

Section C is long answer type.

Section – A

10X01 = 10 Marks

1. Which type of joint a flare is?
   a. Temporary
   b. Permanent
   c. Not comparable
   d. None
2. Which type of condenser is more effective?
   a. Water cooled type
   b. Air cooled type
   c. Not comparable
   d. None
3. Refrigerant flows in a water-cooled condenser are-.
   a. Inside the tube
   b. Outside the tube
   c. Both
   d. None
4. What is the measuring unit power?
   a. Watt
   b. Kelvin
   c. Bar
   d. None
5. There are two measuring instruments, a vernier caliper with least count 0.02 mm and another is a micrometer with least count 0.01 mm. which one is more precise?
   a. Vernier caliper
   b. Micrometer
   c. Not comparable
   d. None
6. Which of the following system involves objective type inspection?
   a. Measuring system
   b. Gauging system
   c. a & b both
   d. None
7. Which of the following system provides result in numerical value?
   a. Measuring system
   b. Gauging system
   c. a & b both
   d. None

8. 36000 BTU is equal to-.
   a. 4 TR
   b. 1.5 TR
   c. 2 TR
   d. 3 TR
9. What is the condition of refrigerant at the exit of evaporator?
   a. Vapour
   b. Liquid
   c. Mixture
   d. None
10. 2.5 cm is equal to-.
   a. 250 mm
   b. 0.25 mm
   c. 25 mm
   d. None

Section – B

04X04 = 16 Marks

1. Write down the Inspection system with the help of flow diagram.
2. Define the term measuring and gauging.
3. The least count of a Vernier caliper is 0.02 mm and minimum measurable value on its main scale is 1mm. Find the total number of divisions on Vernier scale.
4. Convert the following:

   a) 4 TR = -- HP b) 5 TR = -- KW c) 3 TR = -- BTU d) 4.5 HP = -- BTU

   e) 24000 BTU = -- KW f) 2.2 Kg = -- gm g) 1.5 mm = ----- Micron

   h) 70 Micron = --- mm

Section – C

04X06 = 24 Marks

1. Explain vapour compression refrigeration system in detail with neat sketch.
2. Write down the importance of vacuuming process in detail with the help of neat sketch.
3. Write a note on "AC Installation process".
4. Give the name of all the parts of a Micrometer with the help of a neat sketch.

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Course Name: Domestic RAC Appliances **Max. Marks: 50**

ANSWER KEY-A

Section – A

10X01 = 10 Marks

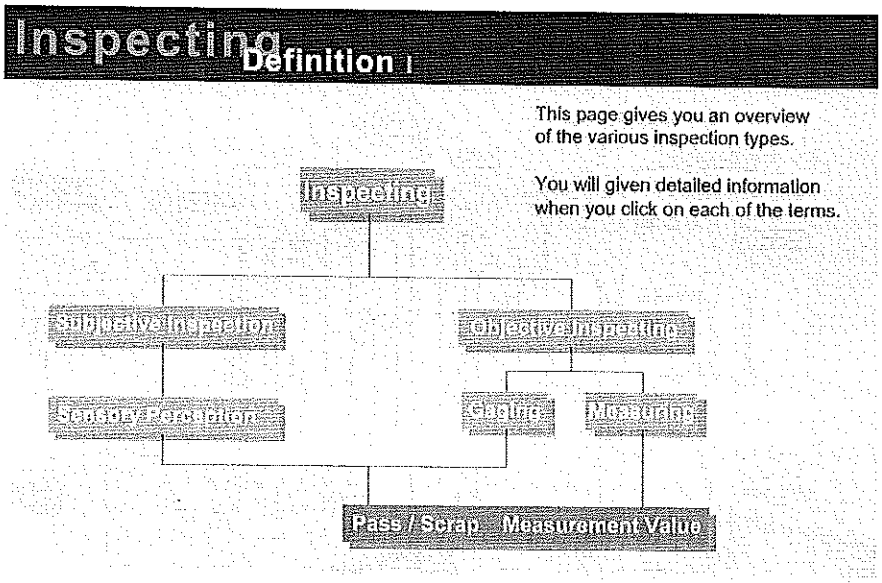
1. Which type of joint a flare is?
   - **a. Temporary**
   - b. Permanent
   - c. Not comparable
   - d. None
2. Which type of condenser is more effective?
   - a. **Water cooled type**
   - b. Air cooled type
   - c. Not comparable
   - d. None
3. Refrigerant flows in a water-cooled condenser are-.
   - a. Inside the tube
   - **b. Outside the tube**
   - c. Both
   - d. None
4. What is the measuring unit power?
   - **a. Watt**
   - b. Kelvin
   - c. Bar
   - d. None
5. There are two measuring instruments, a vernier caliper with least count 0.02 mm and another is a micrometer with least count 0.01 mm. which one is more precise?
   - a. Vernier caliper
   - **b. Micrometer**
   - c. Not comparable
   - d. None
6. Which of the following system involves objective type inspection?
   - **a. Measuring system**
   - b. Gauging system
   - c. a & b both
   - d. None
7. Which of the following system provides result in numerical value?
   - **a. Measuring system**
   - b. Gauging system
   - c. a & b both
   - d. None
8. 36000 BTU is equal to-.
   - a. 4 TR
   - b. 1.5 TR
   - c. 2 TR
   - d. 3 TR

9. What is the condition of refrigerant at the exit of evaporator?
   a. Vapour
   b. Liquid
   c. Mixture
   d. None
10. 2.5 cm is equal to-.
   a. 250 mm
   b. 0.25 mm
   c. 25 mm
   d. None

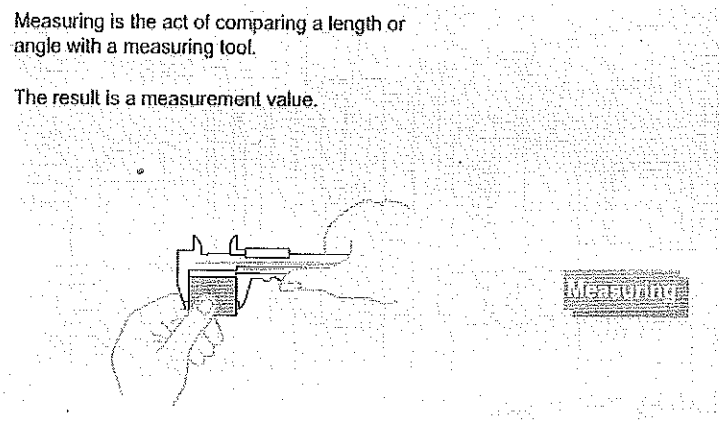
Section – B

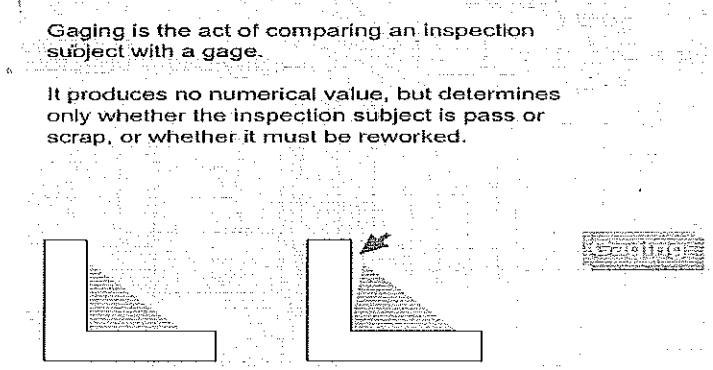
04X04 = 16 Marks

1. Write down the Inspection system with the help of flow diagram.



2. Define the term measuring and gauging.





3. The least count of a Vernier caliper is 0.02 mm and minimum measurable value on its main scale is 1mm. Find the total number of divisions on Vernier scale.

Least count = Minimum measurable value on main scale/ Total no of div. on sec. scale

0.02= 1/x

X= 50

4. Convert the following:

a) 4 TR = -- HP b) 5 TR = -- KW c) 3 TR = -- BTU d) 4.5 HP = -- BTU

e) 24000 BTU = -- KW f) 2.2 Kg = -- gm g) 1.5 mm = ---- Micron

h) 70 Micron = --- mm

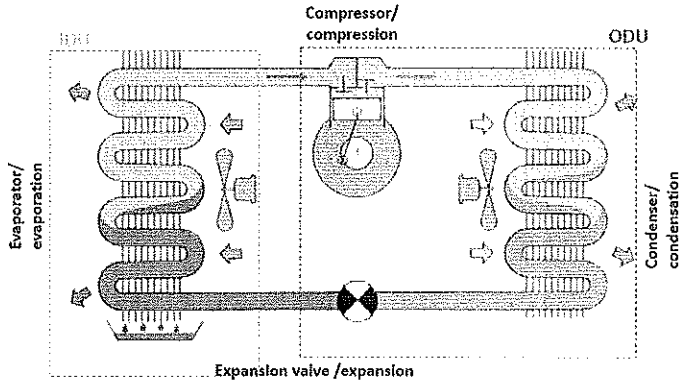
a. 5 b. 17.5 c. 36000 d. 36000 e. 7 f. 2200 g. 1500

h. 0.07

Section – C

04X06 = 24 Marks

1. Explain vapour compression refrigeration system in detail with neat sketch.



2. Write down the importance of vacuuming process in detail with the help of neat sketch.

Vacuums are used to evacuate ACs, a process by which they pull out all air and moisture from the refrigerant system prior to testing, repairs, and recharging.

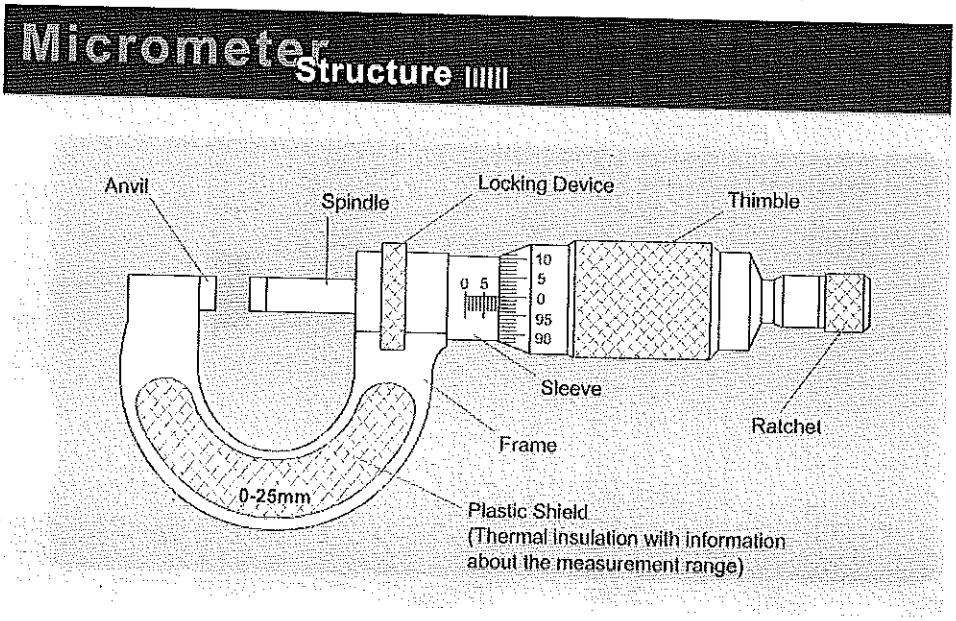
- Setting up Your Vacuum Pump
- Attach your gauges to the ports
- Open your manifold valves
- Start your pump
  Open the side gauge valve

- Allow the vacuum to run for 15-30 minutes
  Close the low-side valve
- Shut off the vacuum pump
- let the vacuum hold for 15 minutes

3. Write a note on "AC Installation process".

- Selecting the right installation area
- Fix the mounting plate and drill outlet hole
- Mounting the indoor AC unit
- Choosing the right installation spot
- Fixing the brackets
- Mounting the outdoor unit
- Connecting the wires
- Connecting the copper pipes
- Vacuuming
- Leak testing
- Commissioning

4. Give the name of all the parts of a Micrometer with the help of a neat sketch.



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End-Sem. Examination

Course Code: RAC1102 **Time: 2 Hours**

Course Name: Domestic RAC Appliances **Max. Marks: 50**

SET-B

Instruction:

All questions are compulsory.

Section A is objective type.

Section B is short answer type.

Section C is long answer type.

Section – A

10X01 = 10 Marks

1. Which of the following system provides result in numerical value?
   a) Measuring system
   b) Gauging system
   c) a & b both
   d) None
2. Which of the following system involves objective type inspection?
   a) Measuring system
   b) Gauging system
   c) a & b both
   d) None
3. There are two measuring instruments, a vernier caliper with least count 0.02 mm and another is a micrometer with least count 0.01 mm. which one is more precise?
   a) Vernier caliper
   b) Micrometer
   c) Not comparable
   d) None
4. What is the measuring unit power?
   a) Watt
   b) Kelvin
   c) Bar
   d) None
5. Refrigerant flows in a water-cooled condenser are-.
   a) Inside the tube
   b) Outside the tube
   c) Both
   d) None
6. Which type of condenser is more effective?
   a) Water cooled type
   b) Air cooled type
   c) Not comparable
   d) None
7. Which type of joint a flare is?
   a) Temporary
   b) Permanent
   c) Not comparable
   d) None

8. 2.5 cm is equal to-.
   a) 250 mm
   b) 0.25 mm
   c) 25 mm
   d) None
9. What is the condition of refrigerant at the exit of evaporator?
   a) Vapour
   b) Liquid
   c) Mixture
   d) None
10. 36000 BTU is equal to-.
   a) 4 TR
   b) 1.5 TR
   c) 2 TR
   d) 3 TR

Section – B

04X04 = 16 Marks

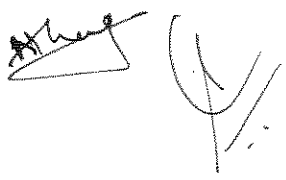
1. Define the term measuring and gauging.
2. The least count of a Micrometer is 0.01 mm and minimum measurable value on its main scale is 0.5 mm. Find the total number of divisions on secondary scale.
3. Define the term condensation and evaporation.
4. Convert the following:

   a) 1 TR = -- HP b) 2 TR = -- KW c) 2 TR = -- BTU d) 2.5 HP = -- BTU
   e) 36000 BTU = -- KW f) 1.1 Kg = -- gm g) 2 mm = ---- Micron
   h) 110 Micron = --- mm

Section – C

04X06 = 24 Marks

1. Explain different type of condensers in detail.
2. Explain the classifications of compressor in detail.
3. Give the name of all the parts of a Micrometer with the help of neat sketch.
4. Write down the importance of swaging process in detail with the help of neat sketch.



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Session: 2020-21 (Summer Semester)

B. Voc. Program, I Semester,

End-Sem. Examination

Course Code: RAC1102 **Time: 2 Hours**

Course Name: Domestic RAC Appliances **Max. Marks: 50**

ANSWER KEY-B

Section – A

10X01 = 10 Marks

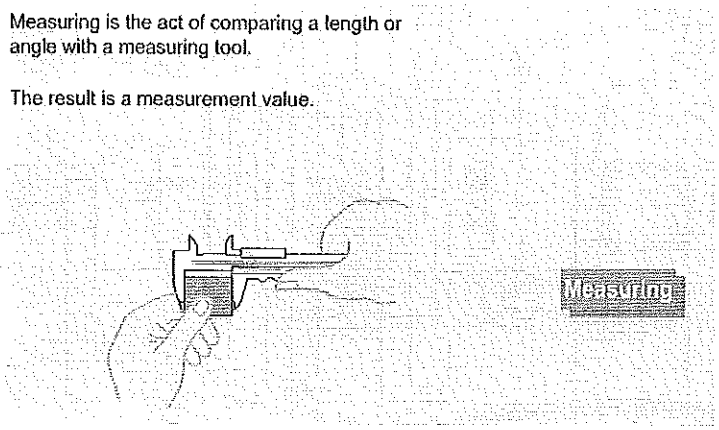
1. Which of the following system provides result in numerical value?
   a) Measuring system
   b) Gauging system
   c) a & b both
   d) None
2. Which of the following system involves objective type inspection?
   a) Measuring system
   b) Gauging system
   c) a & b both
   d) None
3. There are two measuring instruments, a vernier caliper with least count 0.02 mm and another is a micrometer with least count 0.01 mm. which one is more precise?
   a) Vernier caliper
   b) Micrometer
   c) Not comparable
   d) None
4. What is the measuring unit power?
   a) Watt
   b) Kelvin
   c) Bar
   d) None
5. Refrigerant flows in a water-cooled condenser are-.
   a) Inside the tube
   b) Outside the tube
   c) Both
   d) None
6. Which type of condenser is more effective?
   a) Water cooled type
   b) Air cooled type
   c) Not comparable
   d) None
7. Which type of joint a flare is?
   a) Temporary
   b) Permanent
   c) Not comparable
   d) None
8. 2.5 cm is equal to-.
   a) 250 mm
   b) 0.25 mm
   c) 25 mm
   d) None

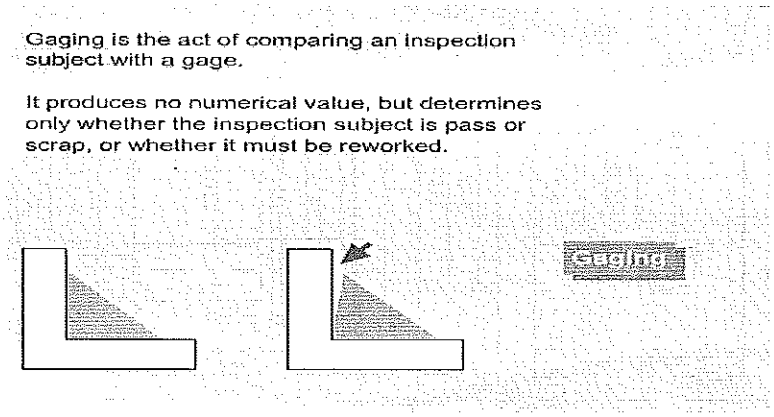
9. What is the condition of refrigerant at the exit of evaporator?
   a) Vapour
   b) Liquid
   c) Mixture
   d) None
10. 36000 BTU is equal to-.
   a) 4 TR
   b) 1.5 TR
   c) 2 TR
   d) 3 TR

Section – B

04X04 = 16 Marks

1. Define the term measuring and gauging.





2. The least count of a Micrometer is 0.01 mm and minimum measurable value on its main scale is 0.5 mm. Find the total number of divisions on secondary scale.

Least count = Minimum measurable value on main scale/ Total no of div. on sec. scale

0.01= 0.5/x

X= 50

3. Define the term condensation and evaporation.

Condensation

When a gas is cooled sufficiently or, in many cases, when the pressure on the gas is increased sufficiently, the forces of attraction between molecules prevent them from moving apart, and the gas condenses to either a liquid or a solid. E.g: Water vapor condenses and forms liquid water (sweat) on the outside of a cold glass or can.

Evaporation

When a liquid is heated sufficiently or when the pressure on the liquid is decreased sufficiently, the forces of attraction between molecules do not prevent them from moving apart, and the liquid evaporates to a gas. E.g: The sweat on the outside of a cold glass evaporates when the glass warms.

4. Convert the following:

a) 1 TR = -- HP b) 2 TR = -- KW c) 2 TR = -- BTU d) 2.5 HP = -- BTU

e) 36000 BTU = -- KW f) 1.1 Kg = -- gm g) 2 mm = ---- Micron

h) 110 Micron = --- mm

a. 1.25	b. 7	c. 24000	d. 24000	e. 10.5
f. 1100	g. 2000	h. 0.11		

Section – C

04X06 = 24 Marks

1. Explain different type of condensers in detail.

Based on the external fluid, condensers can be classified as:

a) Air cooled condensers

b) Water cooled condensers, and

c) Evaporative condensers

Air cooled condensers

As the name implies, in air-cooled condensers air is the external fluid, i.e., the refrigerant rejects heat to air flowing over the condenser. Air-cooled condensers can be further classified into natural convection type or forced convection type.

Water cooled condensers

In water cooled condensers water is the external fluid.

Depending upon the construction, water cooled condensers can be further classified into:

1. Double pipe or tube-in-tube type

2. Shell-and-coil type

3. Shell-and-tube type

Evaporative cooled condensers

In evaporative condensers, both air and water are used to extract heat from the condensing refrigerant. Evaporative condensers combine the features of a cooling tower and water-cooled condenser in a single unit.

2. Explain the classifications of compressor in detail.

Compressors used in refrigeration systems can be classified in several ways:

Based on the working principle:

i. Positive displacement type

ii. Roto-dynamic type

Based on arrangement of compressor motor or external drive:

I. Open type
II. Hermetic (or sealed) type
III. Semi-hermetic (or semi-sealed) type

In positive displacement type compressors, compression is achieved by trapping a refrigerant vapour into an enclosed space and then reducing its volume.

Since the flow of refrigerant to the compressor is not steady, the positive displacement type compressor is a *pulsating flow device* on a microscopic time scale .

Depending upon the construction, positive displacement type compressors used in refrigeration and air conditioning can be classified into:

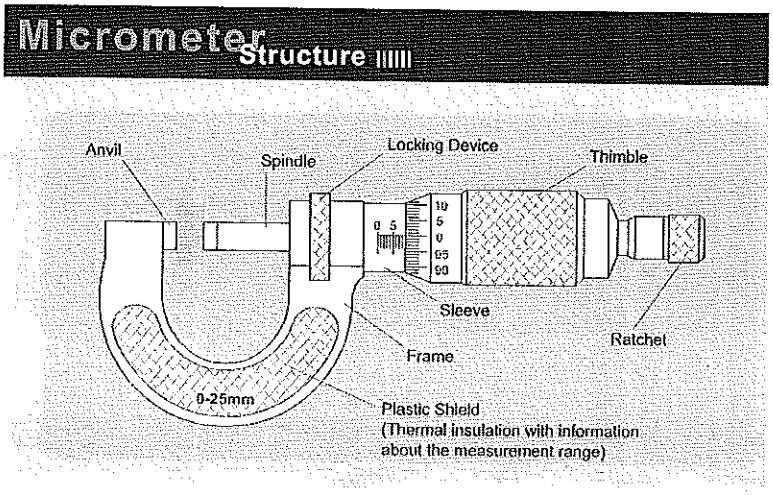
i. Reciprocating type

ii. Rotary type

iii. screw type

iv. scroll compressors

3. Give the name of all the parts of a Micrometer with the help of neat sketch.

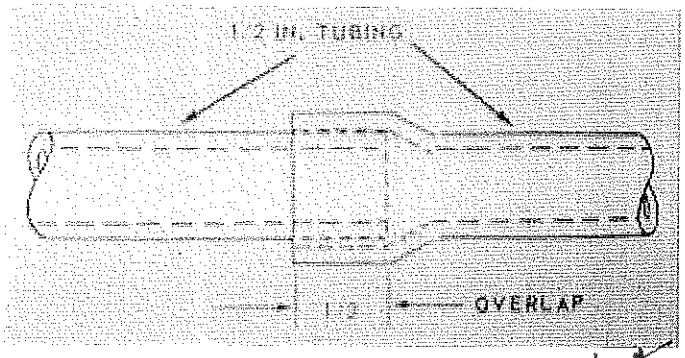


4. Write down the importance of swaging process in detail with the help of neat sketch.

Swaging is the process of expanding the copper tube diameter for the purpose of brazing joint.

Swaging tools use pressure to expand or stretch the end of a piece of copper tubing so it can fit over another of the same diameter and make a permanent brazed connection. Tube swaging seeks to increase the inside diameter of tubing, eliminate the need for additional fittings (which can potentially save money) and reduce the opportunity for leaks.

Swaged ends tend to have a cylindrical shape.



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Registration No.: .....

School of Refrigeration & Air Conditioning Skills

Session: 2021-22 (Summer Semester)

B. Voc. Program, I Semester,

End-Sem. Examination

Course Code: RAC1103 **Time: 2 Hours**

Course Name: RAC Electricals, Electronics & Instrumentation-I **Max. Marks: 50**

Instruction:

Set - A

Section – A

10X01 = 10 Marks

1. The direction of induced current can be determined by flemings
   a) Left hand rule b) Right hand rule
   c) Both d) None
2. What is the measuring unit of electric current?
   a) Volt b) Ampere c) Ohm d) None
3. Fuse is used to protect
   a) resistance b) voltage c) power d) None
4. What is the measuring unit of power?
   a) Watt b) Kelvin c) Bar d) None
5. Kirchoffs first law is
   a) Current law b) Voltage law
   c) Both d) None
6. In ohm's law Voltage is
   a) IxR b) W/J c) IxV d) None
7. Capacitor is also known as
   a) Resistor b) Inductor
   c) Condenser d) None
8. Live wire is represented by which colour
   a) Blue b) Black
   c) Red d) None
9. Distribution box is mainly consists of
   a) Circuit Breakers b) Trip switch
   c) Main switch d) All of the above
10. What happens when a magnet is at rest?
    a) Deflection b) No deflection
    c) None d) All above

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Section – B

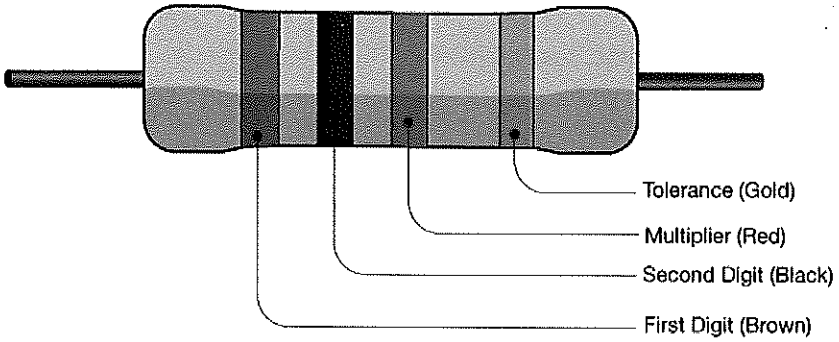
04X04 = 16 Marks

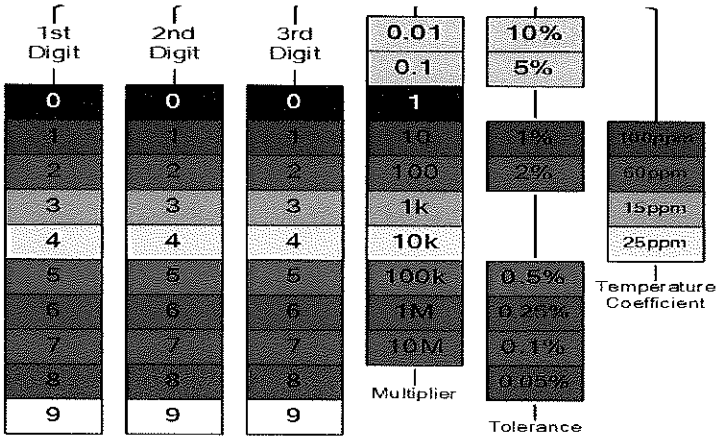
1. Explain Energy.
2. What is a resistor and how do we find the value of a resistor?
3. Explain the difference between AC and DC.
4. Explain V-I characteristics with a neat sketch.

Section – C

04X06 = 24 Marks

1. Explain different components used in house wiring
2. Write a note on wires and cables.
3. Find the value of the resistor.





4. Three resistors of 50 Ω, 30 Ω, and 40 Ω are connected in series to a 60 V battery. Calculate the equivalent resistance of the circuit, the total current in the circuit, the total power generated by the circuit, and the voltage drop across the resistors.

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Set - A

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BHARTIYA SKILL DEVELOPMENT UNIVERSITY

Section – B

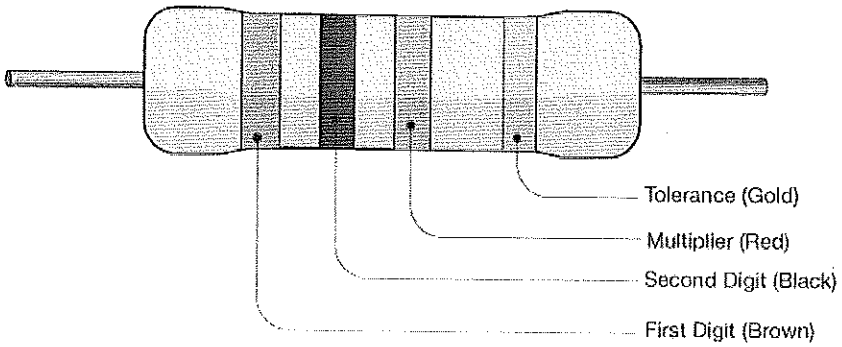
04X04 = 16 Marks

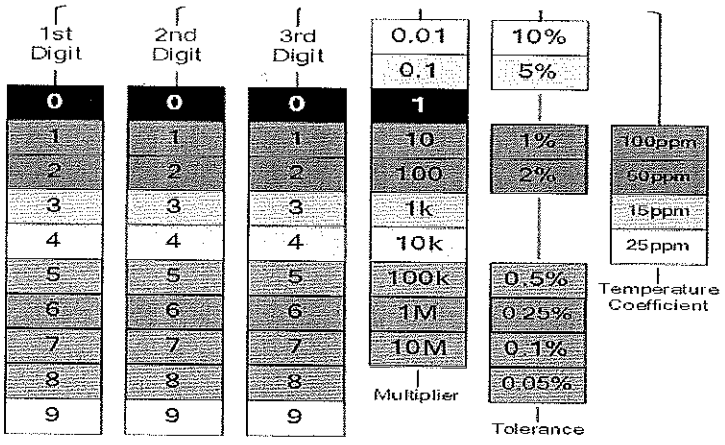
1. Explain Energy?
2. What is a resistor and how do we find the value of a resistor?
3. Explain the difference between AC and DC.
4. Explain V-I characteristics with a neat sketch.

Section – C

04X06 = 24 Marks

1. Explain different components used in house wiring
2. Write a note on wires and cables.
3. Find the value of the resistor?





As we know, the first two colours represent the significant digits of resistance value so the given colours represent digits 2 and 5. The third band is a multiplier band. Hence, the colour red represents a multiplier factor of 102. The last band represents the tolerance level and the tolerance level of the resistor is ±5%. Hence, the resistance value of the given resistor is 2500 ± 5% Ω or 2.5 kΩ.

4. Three resistors of 50 Ω, 30 Ω, and 40 Ω are connected in series to a 60 V battery. Calculate the equivalent resistance of the circuit, the total current in the circuit, the total power generated by the circuit, and the voltage drop across the resistors.

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B. Voc. Program, I Semester,
End-Sem. Examination

Course Code: RAC1103 Time: 2 Hours
Course Name: RAC Electrical, Electronics & Instrumentation – I Max. Marks: 50

ANSWER KEY-A

Section – A

10X01 = 10 Marks

1. The diresction of induced current can bre determined by flemings
   a. Left hand rule
2. What is the measuring unit of electric current?
   b. Ampere
3. Fuse is used to protect
   d. None
4. What is the measuring unit of power?
   a. Watt
5. Kirchoff first law is
   a. Current Law
6. In ohms law voltage is
   a. IxR
7. Capacitor is also known as
   c. Condenser
8. Live wire is represented by which colour
   c. Red
9. Distribution box is mainly consists of
   d. All of the above
10. What happen when magnet is at rest
    a. No deflection

Section – B

04X04 = 16 Marks

1.Explain energy?
Energy is defined as the ability to do work. Energy can be found in many things and can take different forms. For example, kinetic energy is the energy of motion, and potential energy is energy due to an object's position or structure. Energy is never lost, but it can be converted from one form to another.

2. What is a resistor and how do we find the value of a resistor.
A resistor is a passive two-terminal electrical component that implements electrical resistance as a circuit element. In electronic circuits, resistors are used to reduce current flow, adjust signal levels, to divide voltages, bias active elements, and terminate transmission lines, among other uses. Resistors are usually very tiny, and it is challenging to print resistance values on them. So, colour bands are printed on them to represent the electrical resistance. These colour bands are known as resistor colour code. The resistor colour code was invented in the 1920s by the Radio Manufacturers Association (RMA).

3. Explain the difference between AC and DC

	AC Voltage	DC Voltage
Definition	The AC voltage is the force that derive the alternating current between the two points.	The DC Voltage induces the direct current between the two points.

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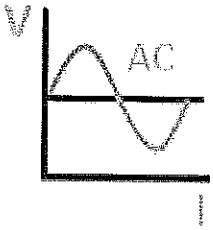
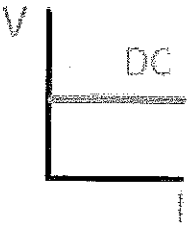
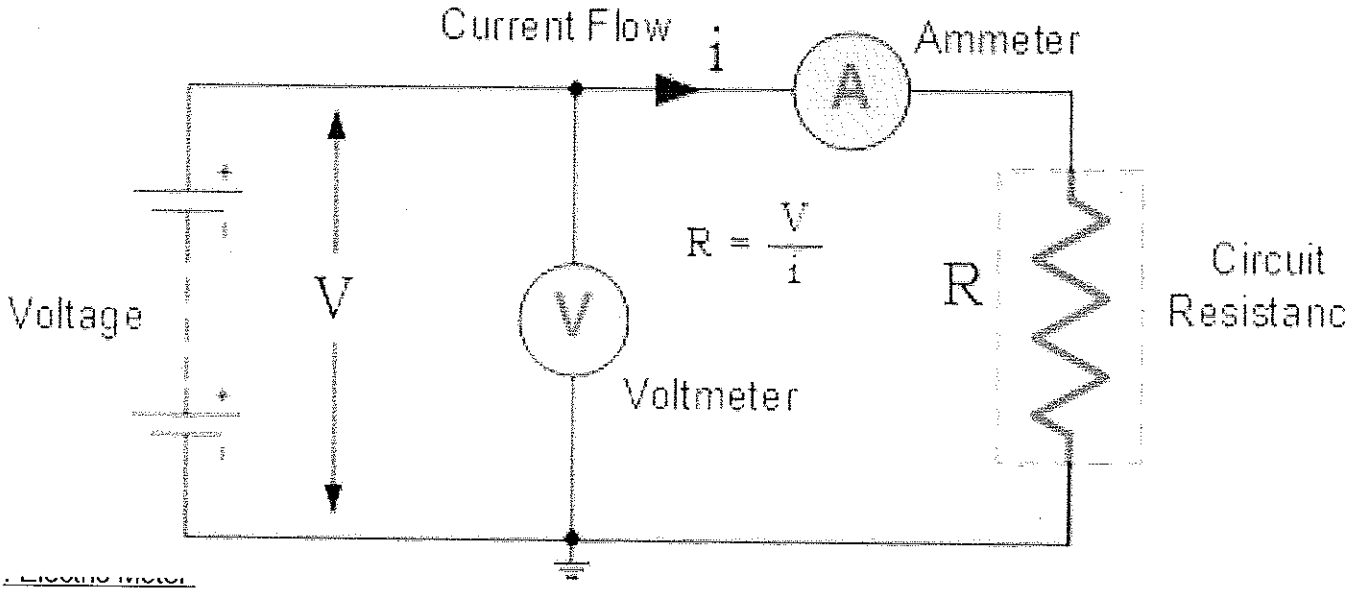
	AC Voltage	DC Voltage
Symbolic Representation		
Frequency	Depends on country.	Zero
Power Factor	Lies between 0 to 1.	0
Polarity	Changes	Remain Constant
Direction	Vary	Remain same
Obtained From	Generator	Cell or Battery
Efficiency	High	Low
Passive Parameter	Impedance	Resistance
Amplitude	Have	Don't Have
Conversion	By using inverter.	By using rectifier.
Transformer	Requires for transmission.	Not requires.

4. Explain V-I charactertics with a neat sketch.



. Electric Meter

First in the list of common electrical parts you see everyday is the Electric meter. It is used by the national electricity grid to measure the units of electrical energy used in your household circuits. Yeah, thats how they find the amount you need to pay for your electricity bill per month. Kilowatt hour (kWh) is an energy unit.

2. Fuse

A fuse is an electrical part which you cant see as its always inside a plug or an electrical device such as TV.

. Distribution Box

Distribution Box Includes These Electrical Parts

Distribution box is another easy to notice electrical part in your home. It consists3 more electrical parts, namely,

Main Switch (MCCB Moulded Case Circuit Breaker)
Trip Switch (RCCB Residual Current Circuit Breaker)
Circuit Breakers (CB)

As the name implies, Distribution Box simply distributes the electric supply to sections of the house. These sections contain light circuits[Light Switches + Light Bulbs],fan circuits[Fan Regulator + Fan] and plug socket circuits.

In each of these circuits the Live Wire is connected to a circuit breaker which will be explained in a moment.

4. Main Switch (MCCB)

You know every house or commercial building has a distribution box which is where the Main Switch is located. Its the first electrical part receiving the electricity from the electric meter inside your house. Therefore the Main Switch is the responsible part to take down the electricity throughout the house as required.

Often useful while upgrading house wiring and when thundering & lightning to disconnect the supply.

Single & Three-phase Main Switches

There are 2 wires inside the cable coming from the electric meter namely Live Wire and Neutral Wire. These 2 wires are then connected to the Main Switch. While the main switch is OFF the electric supply is stopped by disconnecting the two wires.

Yes, you read it right.

Remember, current flows only when the circuit is closed, hence the current flows specifically when the Main Switch is ON. Thats why you need to OFF the Main Switch to disconnect the power. Quite the other way around than the usual switch on. Right?

5. Trip Switch (RCCB)

2. Write a note on wire and cables.

Wires: In house wiring, generally we use poly vinyl chloride wire. PVC coating on copper conductor wires. so it has many advantages as follows.

(a) High dielectric strength

(b) High tensile strength

(c) More defence against moisture

(d) High life

Widely used Long life Durable against water, heat, oil, UV light.

3. How we find the colour code of a resistor.

As we know, the first two colours represent the significant digits of resistance value so the given colours represent digits 2 and 5. The third band is a multiplier band. Hence, the colour red represents a multiplier factor of 102. The last band represents the tolerance level and the tolerance level of the resistor is ±5%. Hence, the resistance value of the given resistor is 2500 ± 5% Ω or 2.5 kΩ.

4. Three resistors are connected in series

Eq. Resistance = R1+R2+R3

= 50+30+40

= 120 ohms.

Current = V/I

= 60/120 = 0.2 Ampere.

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End-Sem. Examination

Course Code: RAC1103 **Time: 2 Hours**

Course Name: RAC Electrical, Electronics & Instrumentation-I **Max. Marks: 50**

Instruction:

Set - B

Section – A

10X01 = 10 Marks

1. Neutral wire is represented by which colour
   a) Blue b) Black
   c) Red d) Green
2. 1 DC volt is equal to how many AC volts?
   a) 1.569 b) 1.414 c) 1.709 d) None
3. Circuit breaker is used to protect
   a) Appliances b) voltage c) power d) None
4. What is the measuring unit of resistance?
   a) Watt b) Kelvin c) Ohm d) None
5. Kirchoff's second law is
   a) Current law b) Voltage law
   c) Both d) None
6. In series connection Total Resistance is equal to is
   a) R1+R2+R3+R4 b) R1+R2=R3+R4 c) 1/R1+1/R2+1/R3+1/R4
   d) None
7. PVC coating on copper conductor wires has advantages like
   a) High Dielectric strength b) High life
   c) High tensile strength d) All of the above
8. Earthing wire is represented by which colour
   a) Blue b) Black
   c) Red d) Green
9. Three phase wiring is used to accommodate
   a) Current b) High loads and currents
   c) Low loads and currents d) All of the above
10. Type of semiconductor is
    a) Intrinsic b) Extrinsic
    c) Both d) None

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Section – B

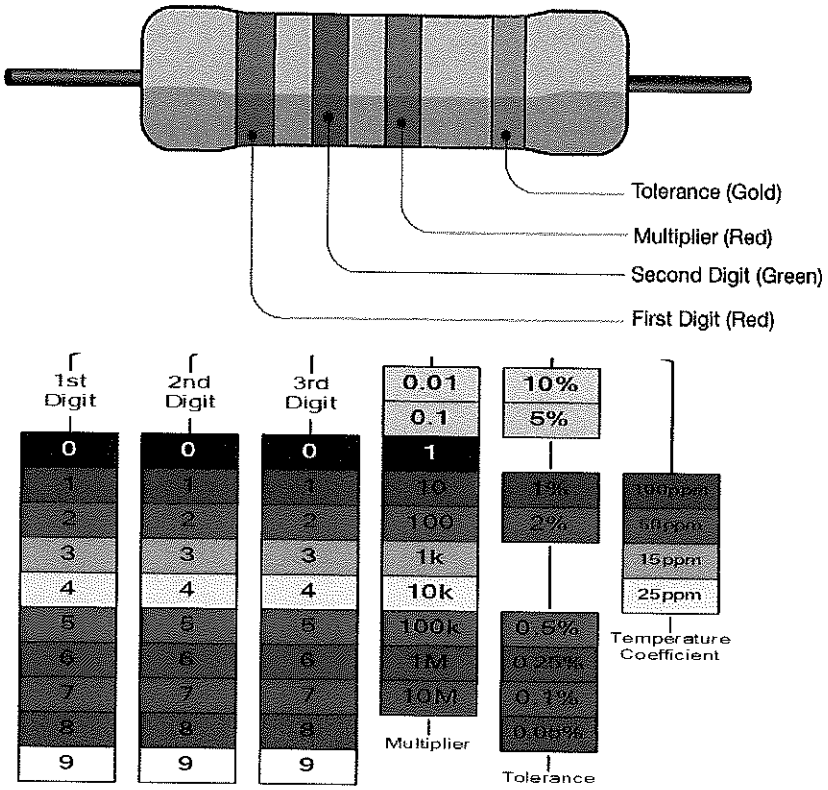
04X04 = 16 Marks

1. Write a note on transistors.
2. Explain three phase wiring.
3. Explain different types of cables.
4. Explain the working of RCCB.

Section – C

04X06 = 24 Marks

1. Explain faraday's first and second law.
2. Find the value of the resistor.



3.Resistors of 10 Ω, 15 Ω, and 5 Ω are all connected in series to a 90 V source of potential difference. Calculate the total equivalent resistance of the circuit, the total current in the circuit, and the potential drop across each resistor.

4. Write a note on Kirchhoff's first and second law with a neat sketch.

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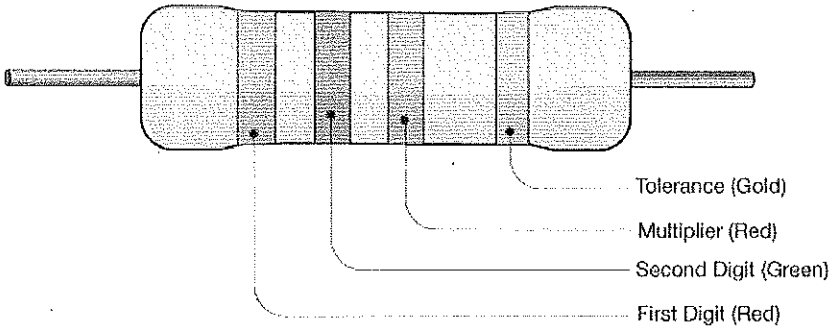

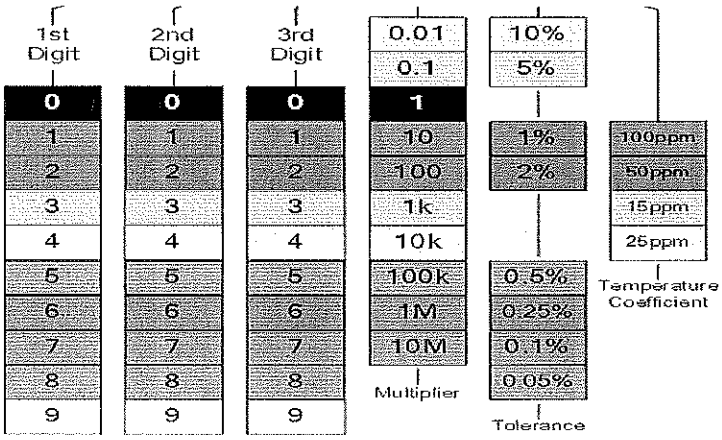

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10. Type of semiconductor is
    a) Intrinsic b) Extrinsic

c) **Both** d) None

Section – B

04X04 = 16 Marks

1. Write a note on transistors?

A transistor is **a semiconductor device used to amplify or switch electrical signals and power**. ... Because the controlled (output) power can be higher than the controlling (input) power, a transistor can amplify a signal. Some transistors are packaged individually, but many more are found embedded in integrated circuits.

2. Explain three phase wiring.

Three-phase power is a three-wire ac power circuit with each phase ac signal 120 electrical degrees apart. ... three-phase is that a three-phase power supply better accommodates higher loads. Single-phase power supplies are most commonly used when typical loads are lighting or heating, rather than large electric motors.

The need for three-phase supply or service occurs when heavy equipments are present such as large motors (beyond 5 HP motors), because such large equipments need high starting and running currents.

3. Explain different types of cables.

Cables: A power cable is an assembly of two or more electrical conductors, usually held together with an overall sheath. The assembly is used for transmission of electrical power. Power cables may be installed as permanent wiring within buildings, buried in the ground. Flexible power cables are used for portable devices, mobile tools and machinery.

It is available in different sizes according to its no. of core wires in it.

PVC cable 2Core, 1.5 Sq. mm.

PVC cable 3Core, 1.5 Sq. mm.

PVC cable 3Core, 2.5 Sq. mm.

PVC cable 5Core, 2.5 Sq. mm.

And so on.

4. Explain the working of RCCB.

Residual Current Circuit Breaker work by comparing the current entering the appliance via the live wire with the current leaving the appliance through the neutral wire. This difference in electrical current is called the residual current. RCCB Tripping current commonly 30mA (0.03A) or 100mA (0.1A), depending on the country it will change.

RCCB consists of,

Primary coil

Secondary coil

Trip coil

Always Primary coil and Secondary coil will sense the load current (IL and IN). When the circuit is OK the IL=IN, then trip coil will not get any current (IL-IN=0A) to energize the trip coil.

When the circuit Not OK the IL>IN, it means the trip coil will get some amount of current (IL-IN=3A). If IL-IN exceeding the RCCB tripping current, Trip coil energized and RCCB immediately trip. It can happen due to a fault in the circuit Or when earth leakage current exceeds the value of tripping current of the RCCB

Section – C

04X06 = 24 Marks

1. Explain faraday's first and second law

Faraday's First Law

Any change in the magnetic field of a coil of wire will cause an emf to be induced in the coil. This emf induced is called induced emf and if the conductor circuit is closed, the current will also circulate through the circuit and this current is called induced current.

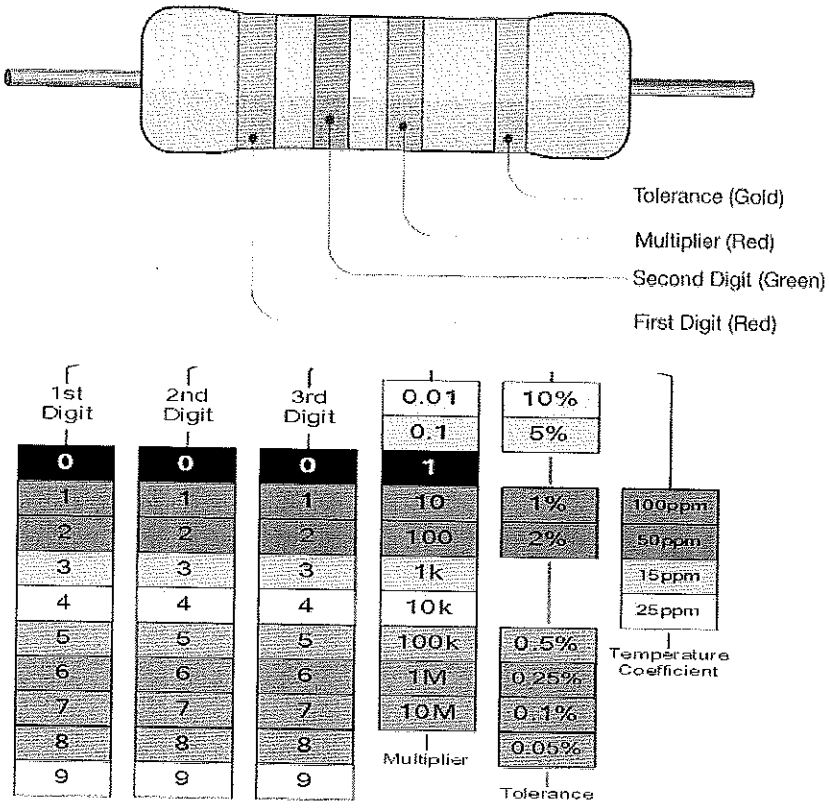
Method to change the magnetic field:

1. By moving a magnet towards or away from the coil
2. By moving the coil into or out of the magnetic field
3. By changing the area of a coil placed in the magnetic field
4. By rotating the coil relative to the magnet

Faraday's Second Law

It states that the magnitude of emf induced in the coil is equal to the rate of change of flux that linkages with the coil. The flux linkage of the coil is the product of the number of turns in the coil and flux associated with the coil.

2. Find the value of the resistor?



As we know, the first two colours represent the significant digits of resistance value so the given colours represent digits 2 and 5. The third band is a multiplier band. Hence, the colour red represents a multiplier factor of 102. The last band represents the tolerance level and the tolerance level of the resistor is ±5%. Hence, the resistance value of the given resistor is 2500 ± 5% Ω or 2.5 kΩ.

3.Resistors of 10 Ω, 15 Ω, and 5 Ω are all connected in series to a 90 V source of potential difference. Calculate the total equivalent resistance of the circuit, the total current in the circuit, and the potential drop across each resistor.

Eq. Resistance = R1+R2+R3

= 50+30+40

= 120 ohms.

Current = V/I

= 60/120 = 0.2 Ampere.

4. Write a note on Kirchhoff's first and second law with a neat sketch.

Kirchhoff's Current Law (KCL) is Kirchhoff's first law that deals with the conservation of charge entering and leaving a junction.Kirchhoff's Current Law (KCL) is Kirchhoff's first law that deals with the conservation of charge entering and leaving a junction.

Kirchhoff's Voltage Law (KVL) is Kirchhoff's second law that deals with the conservation of energy around a closed circuit path.

BHARTIYA SKILL DEVELOPMENT UNIVERSITY

Registration No.: .....

School of Refrigeration & Air Conditioning
Session: 2021-22 (Summer Semester) A
B. Voc., I Semester,
End-Sem. Examination

Course Code: Rac 1104 **Time: 2 Hours**
Course Name: Rac Material & Joining Processes **Max. Marks: 50**
Instruction: Read the questions Carefully
Draw a neat sketch where needed.

Section – A 10X01 = 10 Marks

Q1. Among the following which properties are physical properties of metals?
a) Chemical stability b) Ductility
c) Malleability d) Both b & c

Q2. What is Lusture _____?
a) Ability to mould in Sheet b) Ability to be bend into rolls
c) Shiny surface when cut into pieces d) None of all

Q3. Oxygen is used in brazing for _____
a) Combustion b) Fuel gas c) Clear space d)Heat transfer

Q4. Flux is used for _____ during brazing.
a) To prevent the work piece to form oxide (Oxidation) b)To Provide filler with clear surface
c) To prevent the work piece to have Carbon deposition. D)All the above option

Q5. Nozzles in torch are used for _____?
a) Penetration of heat b) Heat flux to increase. c) Provide ease of filler to deposit. d)All the above

Q6. Primary Classification Types of Joining Process are?
a) Nut b) bolts c) Washers d)Temporary & Permanent Brazing

Q7. On the basic of engineering materials are classified as?
a) Metals & Non-Metals b) Plastic & petroleum
c) alkaline and basic d) None of all

Q8. Safety During flame ignition is _____
a) Use spark Igniter b) Usage of lighter c) High pressure of gases d) Torch angle

Q9. Colour coding for Oxygen & Acetylene
a) Blue & black b) Red & pink c) Blue & red d) White & black

Q10.Welding Electrode 7018?
a) Basic b) Rutile Electrode
c) Cellulose d) Sparklers

Section – B 04X04 = 16 Marks

Q11. What are the safety precautions to be taken in consideration during brazing?
Q12. Difference between Temporary and permanent joints?

Q13. Draw and Define the Vernier caliper used for measuring?
Q14. Name the tools Used for sheet Metal working Process?

Section – C

06X04 = 24 Marks

Q15. Draw the neat sketch of brazing setup and label each of the component?

Q16. What are physical properties of Metals Explain?
Q17. Name and Define the Types of refrigerants?
Q18. Write in brief about Safety used during welding?

BHARTIYA SKILL DEVELOPMENT UNIVERSITY

Registration No.: .....

School of Refrigeration & Air Conditioning

Session: 2021-22 (Summer Semester)

B. Voc., I Semester,

End-Sem. Examination

Course Code: Rac 1104 **Time: 2 Hours**

Course Name: Rac Material joining processes **Max. Marks: 50**

Instruction: Read the questions Carefully

Do, mention the Units Also, where Required.

Section – A

10X01 = 10 Marks

Q1. Which among is used for Permanent joining process?

a) Cotter pin knuckle joint.
b) Brazing and welding
c) Bolts and nuts
d) Option A, C both

Q2. Area is _____

a) 2-Dimensional
b) 3-Dimensional
c) Space
d) None of the above option

Q3. Acetylene Cylinder Line pressure & cylinder pressure are_____

a) 0.25 bar & 200 bar
b) 0.5psi & 200 psi
c) 0.5bar & 200 psi
d) 0.25bar & 19bar

Q4. Why are flux used?

a) To prevent the work piece to form oxide (Oxidation)
b) To Provide filler with clear surface
c) To prevent the work piece to have Carbon deposition.
d) All the above option

Q5. Hand shut valve is a NRV to control _____

a) Control flow of gas outside the nozzle
b) Oxygen in Cutting torch
c) Reduce the outlet of cylinder.
d) To ensure proper flow of oxygen

6). Primary Classification Types of Joining Process are?

a) Welding and brazing
b) Nut & bold
c) Temporary & Permanent
d) Adhesive

7.In OXY-FUEL Process which has high pressure?

a) Butane

b) Acetylene
c) Oxygen
d) Argon

8.Oxygen cylinder Line pressure & cylinder pressure are
a) 0.25 bar & 200 bar
b) 0.5psi & 200 psi
c) 0.5bar & 200 psi
d) 0.25Psi &19bar

9. Colour coding for Oxygen & Acetylene
a) Red &Blue
b) Black & white
c) Blue & Red
d) maroon & Ruby Red

10.Welding Electrode 6013?
a) Cellulose Electrode
b) Rutile Electrode
c) Basic Electrode
d) Special Purpose Electrode

Section – B

04X04 = 16 Marks

Q11. What are the safety precautions to be taken in consideration during brazing?

Q12. Difference between Temporary and permanent joints?

Q13. Define Brazing & Temperature Range for Brazing?

Q14. Name the tools Used for sheet Metal working Process?

Section – C

06X04 = 24 Marks

Q15. Draw the neat sketch of brazing setup and label each of the component.?

Q16. Calculate the following Area, Perimeter?

Triangle with equal sides of 2cm each

square with side 10 cm

Circle with radius 8 cm

Q17. Explain the process of Brazing filler addition?

Q18. Write in brief about Safety used during Welding?

BHARTIYA SKILL DEVELOPMENT UNIVERSITY

Registration No.: .....

School of Refrigeration & Air Conditioning

Session: 2021-22 (Summer Semester)

B. Voc., I Semester,

End-Sem. Examination

Course Code: Rac 1104 **Time: 2 Hours**

Course Name: Rac Materials & Joining processes **Max. Marks: 50**

Instruction: Read the questions Carefully

Do, mention the Units Also, where Required.

Section – A

10X01 = 10 Marks

Q1. Area is _____

a) 2-Dimensional

Q2. ~~Which among is used for Permanent joining process?~~

A1 → a(Cotter) ~~B) Brazing and welding~~

Q3. Acetylene Cylinder Line pressure & cylinder pressure are_____

d) 0.25bar & 19bar

Q4. Why are flux used?

d)All the above option

Q5. Hand shut valve is a NRV to control _____

B) Oxygen in Cutting torch

6). Primary Classification Types of Joining Process are?

c)Temporary & Permanent

7.In OXY-FUEL Process which has high pressure?

c)Oxygen

8.Oxygen cylinder Line pressure & cylinder pressure are

d)0.5bar & 200 psi

9. Colour coding for Oxygen & Acetylene

c)Blue & Red

10.Welding Electrode 6013?

b) Rutile Electrode

Section – B

04X04 = 16 Marks

Q11. What are the safety precautions to be taken in consideration during brazing?

- Use the tools and equipment with care;
- If needed to apply flux, do not use with fingers;
- Nitrogen introduction as protective gas low flow rate inside the pipe assembly during brazing process is good method to avoid oxidation;
- Protect the service valves with wet rags or heat sink material;
- Use only recommended fillers for various joints;
- Never reach temp beyond limits, Keep heating both the tubes, evenly.

Q12. Difference between Temporary and permanent joints?

A12.

Temporary Joint	Permanent Joint
Temporary joints allow easy dismantling of assembled components without breaking them.	Permanent joints don't allow dismantling of assembled components without rupturing them.
Temporary joints are not necessarily leak-proof.	Permanent joints are usually leak-proof.
Strength of temporary joint is comparatively less.	Strength of permanent joint is high. Usually joint strength is same with that of the components.
Repair and replacement are also easy.	Repair and replacement are difficult and costly.

Q13. Define Brazing & Temperature Range for Brazing?

A13. Brazing is non detachable joining process most common in AIR-CONDITIONING or pipelines for producing tough, strong and leak proof joint.

Temperature range for brazing is Above 450 Degree and below 1000 Degree

In brazing the base metal is heated and the filler rod is used to deposit the molten metal pool for solidification

Q14. Name the tools Used for sheet Metal working Process?

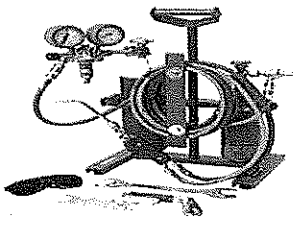
A.14

Sr No.	Measuring	Marking	Cutting
1	Steel ruler- for measuring linear	Scribe- deepen marks	Shear Table-
2	Measuring tape	centre punch	notch
3	Feller gauge	prick punch	Pad brake
4	Steel wire and Sheet metal gauge	Grooving stake	Combination snip
5	Angle plate	scriber	Tinner snips Left & Right
6	Combination square	Divider	Circle cutter
7	Try square	Marker	Drill MACHINE
8	Vernier calliper		Drill bit

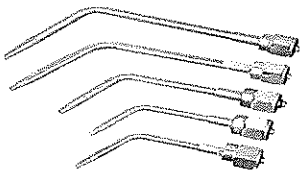
Section – C

06X04 = 24 Marks

Q15. Draw the neat sketch of brazing setup and label each of the component?

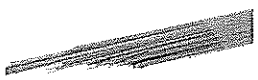


Brazing tool kit



Brazing Nozzle

Brazing tool kit



Filler Material

Heat Deflector

A.15

Usage of flux powder , liquid and Injectables

Q16. Calculate the following Area, Perimeter?

Triangle with equal sides of 2cm each

square with side 10 cm

Circle with radius 8 cm

a) A.16 Triangle with equal sides of 2cm each

= Area for equilateral triangle equal to $=\frac{\sqrt{3}\ X\ (2cm)^2}{4} = 1.73cm$ square

Perimeter = 3a =6 cm

b) square with side 10 cm = 10X10=100Sq. Cm

perimeter = 4X10= 40cm

circle = PI X R^2 = 3.14X 64= 201.46

Q17.

A17. When selecting a braze filler metal important factors to consider are:

- The base metals being joined.
- The brazing process to be used.
- The brazing temperature.
- How the braze filler metal is applied to the joint.
- The design of the joint.
- What form the braze filler is available in.
- The environment and service of the joint.

R-134a, R410-a

Q18. Write in brief about Safety used during welding?

A18 Welding safety includes the following.

1.safety shoes

2. glass shield

3.Din helmet

4. Leather strips

5.artifical ventilators for fumes exhaust

Check for grounding of earth cables

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Registration No.: .....

(A)

School of Refrigeration & Air Conditioning

Session: 2021-22 (Summer Semester)

B. Voc., I Semester,

End-Sem. Examination

Course Code: Rac 1104 **Time: 2 Hours**

Course Name: Rac Material & Joining Processes **Max. Marks: 50**

Instruction: Read the questions Carefully

Draw a neat sketch where needed.

Section – A

10X01 = 10 Marks

Q1. Among the following which properties are physical properties of metals?
d) Both b & c
Q2. What is Lusture _____?
c) Shiny surface when cut into pieces
Q3. Oxygen is used in brazing for _____
a) Combustion
Q4. Flux is used for _____ during brazing.
d)All the above option
Q5. Nozzles in torch are used for _____?
d)All the above
Q6. Primary Classification Types of Joining Process are?
d)Temporary & Permanent Brazing
Q7. On the basic of engineering materials are classified as?
a) Metals & Non-Metals
Q8. Safety During flame ignition is _____
a) Use spark Igniter
Q9. Colour coding for Oxygen & Acetylene
a) Blue & black
Q10.Welding Electrode 7018?
a) Basic

Section – B

04X04 = 16 Marks

Q11. What are the safety precautions to be taken in consideration during brazing?

- Use the tools and equipment with care;
- If needed to apply flux, do not use with fingers;
- Nitrogen introduction as protective gas low flow rate inside the pipe assembly during brazing process is good method to avoid oxidation;
- Protect the service valves with wet rags or heat sink material;
- Use only recommended fillers for various joints;
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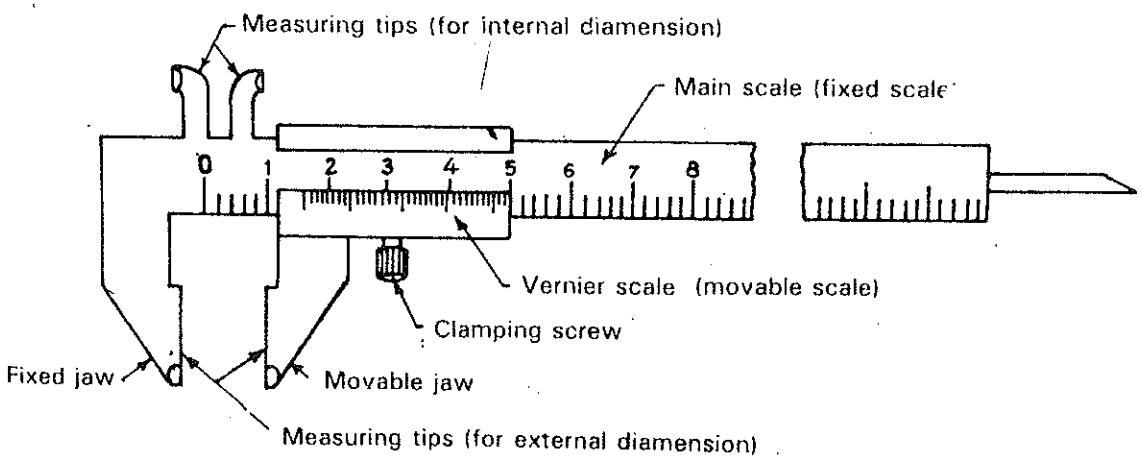
Q13. Draw and Define the Vernier caliper used for measuring?



Q14. Name the tools Used for sheet Metal working Process?

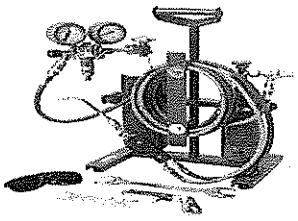
A.14

Sr No.	Measuring	Marking	Cutting
1	Steel ruler- for measuring linear	Scribe- deepen marks	Shear Table-
2	Measuring tape	centre punch	notch
3	Feller gauge	prick punch	Pad brake
4	Steel wire and Sheet metal gauge	Grooving stake	Combination snip
5	Angle plate	scriber	Tinner snips Left & Right
6	Combination square	Divider	Circle cutter
7	Try square	Marker	Drill MACHINE
8	Vernier calliper		Drill bit

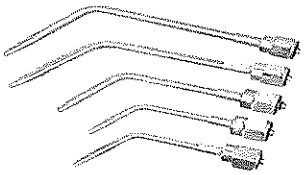
Section – C

06X04 = 24 Marks

Q15. Draw the neat sketch of brazing setup and label each of the component?



Brazing tool kit



Brazing Nozzle

Brazing tool kit

Filler Material

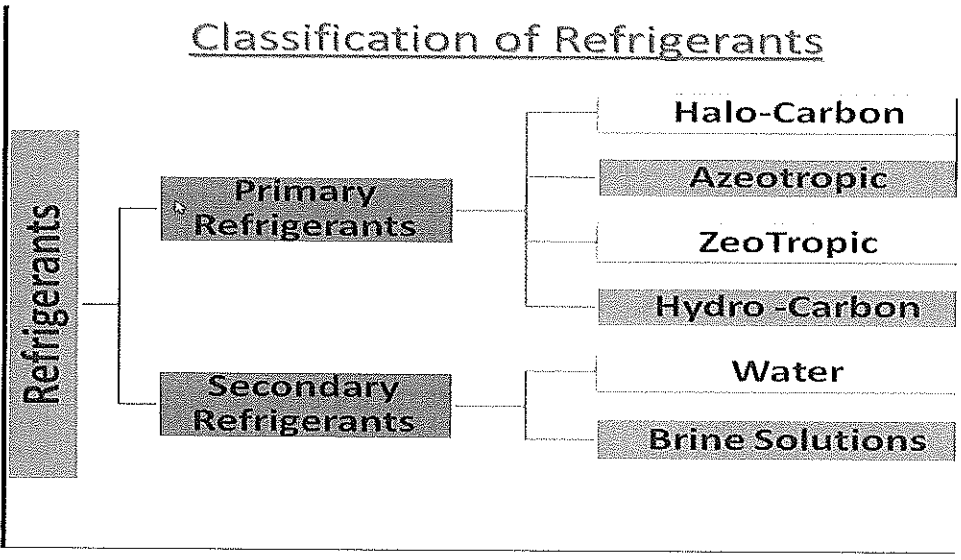
Heat Deflector

A.15

Q16. What are physical properties of Metals Explain?

Property	Metals	Non-Metals
Lustre (metallic shine)	All metals have lustre	Have no lustre (except Iodine and Graphite)
Hardness	Very hard (except Sodium and Potassium)	Not hard (except Diamond, Tin and Graphite)
Malleability (property due to which a substance can be beaten into sheets)	Highly malleable (except Zinc, Antimony and Arsenic)	Non malleable
Ductility (property by which a substance can be drawn into wire)	Ductile (except Zinc, Arsenic and Antimony)	Non ductile (except Carbon fiber)
Conductivity	Good conductor of heat and electricity (except Bismuth and Tungsten)	Bad conductor of heat and electricity, (except Graphite and gas carbon)
State	Solid (except Mercury and Gallium)	Solid, liquid or gas
Density	High density (except sodium and potassium)	Low density (except diamond)

Q17. Name and Define the Types of refrigerants?



A.17

Q18. Write in brief about Safety used during welding?

A.18. Welding safety includes the following.

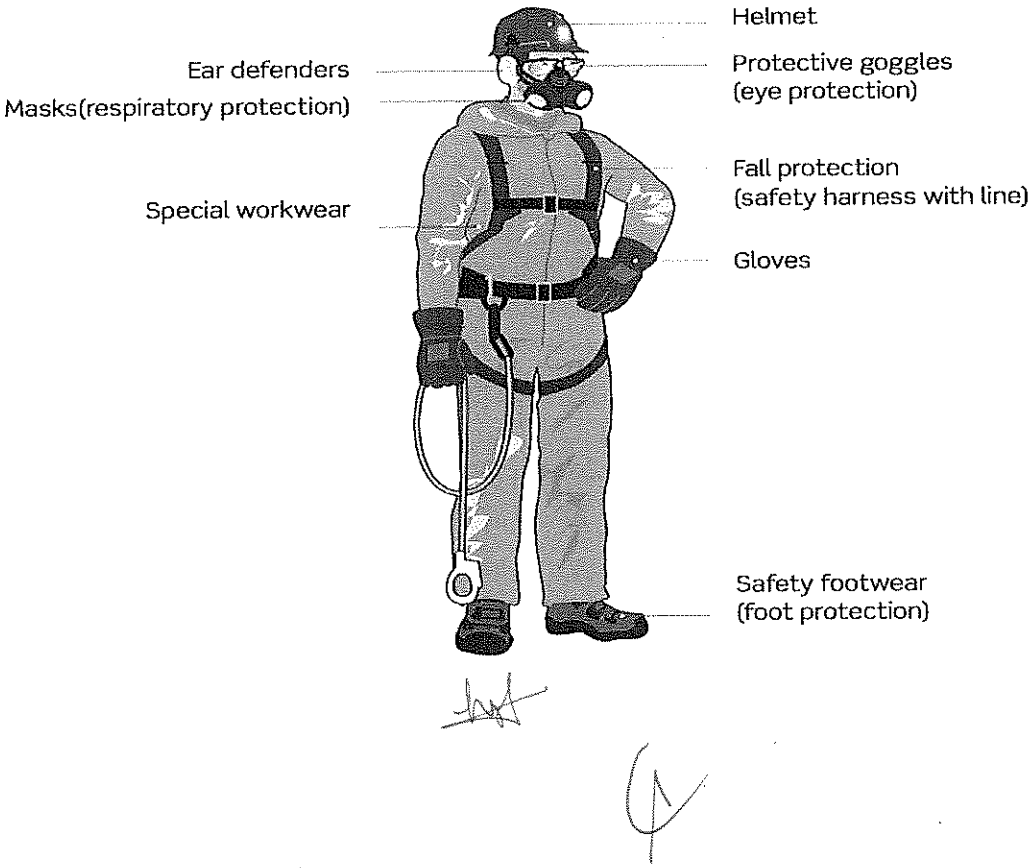
1.safety shoes

2. glass shield

3. Iin helmet

4. Leather strips

5.artifical ventilators for fumes exhaust



BHARTIYA SKILL DEVELOPMENT UNIVERSITY

Registration No.: .....

School of Refrigeration & Air Conditioning Skills

Session: 2021-22 (Summer Semester)

B. Voc. Program, Ist Semester,

End-Sem. Examination

Course Code: RAC1105 **Time: 2 Hours**

Course Name: RAC System Components Testing & Performance **Max. Marks: 50**

Instruction: In section A write both answers and options.

Set – A

Answer Sheet

Section – A

10X01 = 10 Marks

1. The cooling capacity is normally controlled either by compressor speed regulation or _____.

   a. Increasing temperature.

2. _____ consists of a cylindrical rotor eccentrically placed in the casing.

   c. Vane Compressor

3. For compression ratio more than _____ multistage compressors are used.

   b. 5

4. _____ oil is suitable for R134a refrigerant.

   c. POE

5. _____ has a pair of intermeshing rotors housed in a suitable casing to produce compression.

   d. Screw compressor

6. Fins are measured in _____

   a. FPM

7. LG has come up with specially designed air conditioners which provide protection against corrosion using advanced _____ technology.

   b. Ocean Black protection

8. _____ is a very important parameter affecting the performance of the condenser.

   c. Velocity of air

9. Hot gas bypass provides _____ on the evaporator.

   d. an artificial load

10. An increase in RPM by 10%, increase the static pressure by _____.

    b,. 21%

Section – B

04X04 = 16 Marks

11. What is the difference between a pressure gauge and pressure switch?

Answer: A pressure gauge is a pressure indicating device that provides a local readout of pressure to monitor the operation or condition of a process by locally indicating a quantity of pressure. A pressure switch is a device that, after the deviation of a physical pressure, opens or closes a set of contacts. The pressure setting can typically be adjusted and is used to open or close a valve or turn a pump on or off based on the physical pressure.

12. What is the difference between reciprocating compressor and rotary compressor?

Answer: Rotary screw compressor features:

- Optional designs and enclosures to reduce noise levels
- More energy efficient
- Generates less heat
- Functional in extreme temperatures
- Safe and relatively small in size
- Continuous operation with no pistons to rest for cooling

Reciprocating compressor features:

- Produces both high power and high pressure
- No oil carryover
- Greater compression range
- Better for intermittent operation
- Most commonly used compressor
- Lower initial set-up cost

13. What is the difference between natural cooled and forced cooled condenser?

Answer: In natural convection type, heat transfer from the condenser is by buoyancy induced natural convection and radiation. Since the flow rate of air is small and the radiation heat transfer is also not very high, the combined heat transfer coefficient in these condensers is small. As a result a relatively large condensing surface is required to reject a given amount of heat.

In forced convection type condensers, the circulation of air over the condenser surface is maintained by using a fan or a blower. These condensers normally use fins on air-side for good heat transfer. The fins can be either plate type or annular type.

14. What are the advantages and disadvantages of reciprocating compressors?

Answer: Advantages:

1. High thermal efficiency and low power consumption per unit
2. Convenient processing, low material requirements and low cost
3. Simple device system
4. Early design and production, mature manufacturing technology

Disadvantages:

1. There are many moving parts, complex structure, heavy maintenance work and high maintenance cost
2. Speed Limited

3. The wear of piston ring, the wear of cylinder and the transmission mode of belt make the efficiency drop rapidly
4. Loud noise

Section – C

04X06 = 24 Marks

15. Explain the pressure enthalpy chart.

Answer: A log P/h diagram, and indicates the refrigerant's various thermodynamic states. This diagram can be seen as a map of the refrigerant. The area above and to the left of the saturation line for liquid is the area where the refrigerant is sub-cooled, i.e. the temperature is lower than the saturation temperature for the pressure range in question. The area above and to the right of the saturation line for gas) is the area where the gas is superheated, or overheated, i.e. the gas has a higher temperature than the saturation temperature at that pressure. The area below the saturation lines for liquid and gas) represents the conditions where the refrigerant can change its state of aggregation from liquid to gas or vice versa. Hence, there is a mixture of gas and liquid.

16. Explain the fan laws.

Answer:

a. Fan Law 1: CFM is directly proportional to RPM.
   Formula: CFM2 = CFM1 X (RPM2 ÷ RPM1) or RPM2 = RPM1 X (CFM2 ÷ CFM1)
b. Fan Law 2: Total Static Pressure changes with the square of CFM (or RPM).
   Formula: SP2 = SP1 X $(CFM2 \div CFM1)^2$ or SP2 = SP1 X $(RPM2 \div RPM1)^2$
c. Fan Law 3: Horsepower changes with the cube of CFM (or RPM)
   Formula: HP2 = HP1 X $(CFM2 \div CFM1)^3$

17. Explain the system characteristics for flow and static pressure drop.

Answer: System resistance: sum of static pressure losses in the system. Depends upon ducts, pickups, elbows and the pressure drops across equipment.
The system resistance varies with the square of the volume of air flowing through the system.
Fan characteristics can be represented in the form of fan curve(s). The fan curve is a performance curve for the particular fan under a specific set of conditions. It is developed for a given set of conditions usually including: fan volume, system static pressure, fan speed, etc.

18. Write a short note on following:

Answer:

Hot gas bypass:

a. air conditioning system is desired at lower than design conditions.
b. If return air conditions will be 50 percent RH or lower, the unit should incorporate the hot gas bypass option.
c. Hot gas bypass provides an artificial load on the evaporator

Solenoid valve:

Their function is simply to turn refrigerant flow on and off.
Application :

- Pump-down cycle
- Temperature control of separate units in a multiple system
- Suction applications

- Compressor unloading

BHARTIYA SKILL DEVELOPMENT UNIVERSITY

Registration No.: .....

School of Refrigeration & Air Conditioning Skills

Session: 2021-22 (Summer Semester)

B. Voc. Program, Ist Semester,

End-Sem. Examination

Course Code: RAC1105 **Time: 2 Hours**

Course Name: RAC System Components Testing & Performance **Max. Marks: 50**

Instruction: In section A write both answers and options.

Set – A

Section – A

10X01 = 10 Marks

1. The cooling capacity is normally controlled either by compressor speed regulation or _____.

   a. Increasing temperature. b. suction gas throttling.

   c. Decrease temperature. d. Discharge gas throttling

2. _____ consists of a cylindrical rotor eccentrically placed in the casing.

   a. Screw Compressor. b. Scroll Compressor

   c. Vane Compressor d. All of above

3. For compression ratio more than _____ multistage compressors are used.

   a. 4 b. 5

   c. 6 d. 7

4. _____ oil is suitable for R134a refrigerant.

   a. AB b. Mineral Oil

   c. POE d. PAG

5. _____ has a pair of intermeshing rotors housed in a suitable casing to produce compression.

   a. Capillary b. Water cooled condenser

   c. Scroll Compressor d. Screw compressor

6. Fins are measured in _____

   a. FPM b. CFM

   c. RPM d. FPS

7. LG has come up with specially designed air conditioners which provide protection against corrosion using advanced _____ technology.

   a. Gold fin b. Ocean Black protection

   c. Black fin d. Blue fin

8. _____ is a very important parameter affecting the performance of the condenser.

   a. Atmospheric pressure b. Humidity

   c. Velocity of air d. Fan motor current

9. Hot gas bypass provides _____ on the evaporator.

   a. Pressure
   b. Balance
   c. Boost
   d. an artificial load

10. An increase in RPM by 10%, increase the static pressure by _____.

   a. 19%
   b. 21%
   c. 27%
   d. 33%

Section – B

04X04 = 16 Marks

11. What is the difference between a pressure gauge and pressure switch?
12. What is the difference between reciprocating compressor and rotary compressor?
13. What is the difference between natural cooled and forced cooled condenser?
14. What are the advantages and disadvantages of reciprocating compressors?

Section – C

04X06 = 24 Marks

15. Explain the pressure enthalpy chart.
16. Explain the fan laws.
17. Explain the system characteristics for flow and static pressure drop.
18. Write a short note on following:
    a. Hot gas bypass
    b. Solenoid valve

BHARTIYA SKILL DEVELOPMENT UNIVERSITY

Registration No.: .....

School of Refrigeration & Air Conditioning Skills

Session: 2021-22 (Summer Semester)

B. Voc. Program, I Semester,

End-Sem. Examination

Course Code: RAC1105 **Time: 2 Hours**

Course Name: RAC System Components Testing & Performance **Max. Marks: 50**

Instruction: In section A write both answers and options.

Set - B

Section – A

10X01 = 10 Marks

1. Liquid should boil when atmospheric pressure is _____.
   a. Very low
   b. Higher than temperature
   c. Equal to vapor pressure
   d. Lower Than vapor pressure
2. Superheat: The heating of a vapor _____its _____.
   a. Above, Boiling point
   b. Above, Boiling pressure
   c. Below, Boiling point
   d. Below. Boiling pressure
3. Condensing temperature is determined by the_____ in the system.
   a. High side pressure
   b. Low side pressure
   c. Medium side pressure
   d. All of above
4. Evaporator outlet temperature minus the evaporator saturation temperature, is the _____ of the system.
   a. Subcooling
   b. Desuperheating
   c. Superheating
   d. Saturation temperature
5. _____ reads 0 when opened to the atmosphere.
   a. Pressure Switch
   b. Pressure Gauges
   c. Barometer
   d. Manometer
6. _____ can travel through a vacuum.
   a. Radiation
   b. Convection
   c. Conduction
   d. Refrigerant
7. Fahrenheit is a temperature scale in _____ system.
   a. Refrigeration
   b. SI
   c. English
   d. Metric
8. _____lines extend from the saturated vapor line out into the superheated vapor-portion of the chart at a slight angle from the horizontal axis.

a. Specific Volume lines
b. Enthalpy line
c. Temperature line
d. Entropy lines

9. The ratio of absolute _____/absolute _____ is known as compression pressure.
   a. discharge pressure, suction pressure
   b. suction pressure, discharge pressure
   c. discharge temperature, suction temperature
   d. suction temperature, discharge temperature
10. There is _____ BTUs/hr in 1 watt.
   a. 34.14
   b. 3.414
   c. 0.3141
   d. 34.14

Section – B

04X04 = 16 Marks

11. Explain the type of expansion valves?
12. What are the differences among fan blower and compressor according to compression ratio?
13. Explain the actual cop with an example.
14. Write a short note on air cooled heat exchangers.

Section – C

04X06 = 24 Marks

15. Explain the scroll compressor.
16. What are the factors which affect the efficiency of the refrigeration system?
17. What is the application of a filter dryer in a refrigeration system?
18. What is LBP HBP and MBP, how are they connected with COP of the system?

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Course Name: : RAC System Components Testing & Performance **Max. Marks: 50**

Instruction: In section A write both answers and options.

Set - B

Section – A

10X01 = 10 Marks

1. Liquid should boil when atmospheric pressure is _____.

   c. Equal to vapor pressure

2. Superheat: The heating of a vapor _____its _____.

   a. Above, Boiling point

3. Condensing temperature is determined by the_____ in the system.

   a. High side pressure

4. Evaporator outlet temperature minus the evaporator saturation temperature, is the _____ of the system.

   c. Superheating

5. _____ read 0 when opened to the atmosphere.

   b. Pressure Gauges

6. _____ can travel through a vacuum.

   a. Radiation

7. Fahrenheit is a temperature scale in _____ system.

   c. English

8. _____lines extend from the saturated vapor line out into the superheated vapor-portion of the chart at a slight angle from the horizontal axis.

   a. Specific Volume lines

9. The ratio of absolute _____/absolute _____ is known as compression pressure ratio.

   a. discharge pressure, suction pressure

10. There is _____ BTUs/hr in 1 watt.

    b. 3.414

Section – B

04X04 = 16 Marks

11. Explain the type of expansion valves.

Answer:

- Thermal Expansion Valves (TEVs)
- Manual Valves
- Capillary Tubes
- Automatic Valves
- Electronic Expansion Valves
- Float Valves

12. What are the differences among fan blower and compressor according to compression ratio?

Answer:

TABLE 5.1 DIFFERENCES BETWEEN FANS, BLOWER AND COMPRESSOR

Equipment	Specific Ratio	Pressure rise (mmWg)
Fans	Up to 1.11	1136
Blowers	1.11 to 1.20	1136 – 2066
Compressors	more than 1.20	–

13. Explain the actual cop with an example.

Answer: The Coefficient Of Performance (COP) is a performance rating that tells us how effective a heat pump or air conditioner is at transferring heat versus the amount of electrical power it consumes. Remember, heat pumps and air conditioners move heat from a low temperature area, and pump this heat "uphill" to a high temperature area, and against the laws of thermodynamics (Heat Laws), which says that naturally heat flows from something that is hot, to something that is cold.

14. Write a short note on air cooled heat exchangers.

Answer: Air Cooled Heat Exchanger (ACHE) is a heat rejection equipment where the excess process heat is rejected to the atmosphere. It works on the principle of convection and conduction to dissipate heat from process fluid to air. The process fluid passes through the tubes and air stream is passed over the tubes to carry away the heat; air streams are created by the fans mounted on the unit. By suitably selecting the tube material, 'ACHE' can effectively cool or condense process water, chemicals or any other heat transfer fluid

Section – C

04X06 = 24 Marks

15. Explain the scroll compressor.

Answer: Scroll compressors are becoming more popular for use in HVAC systems, as they are more reliable and efficient than reciprocating types. A scroll compressor has one fixed scroll which remains stationary and another moving or orbiting scroll that rotates through the use of a swing link. When this happens, the pockets of refrigerant between the two scrolls are slowly pushed to the center of the two scrolls,

causing the reduction of the volume of the gas. It is then discharged though the center port to the condenser.

16. What are the factors which affect the efficiency of the refrigeration system?

Answer: The major factors that affect the efficiency of a refrigeration system are:

The evaporating temperature
The condensing temperature
The type of refrigerant used
The type of equipment used, such as compressor, evaporator, etc
The system controls
Correct maintenance of the system

17. What is the application of a filter dryer in a refrigeration system?

Answer: Filter-driers are a key component in any refrigeration or air conditioning system. Here we describe the basic function of these devices and differences between the various types currently available.

A filter-drier in a refrigeration or air conditioning system has two essential functions: one, to adsorb system contaminants, such as water, which can create acids, and two, to provide physical filtration. Evaluation of each factor is necessary to ensure proper and economical dryer design.

18. What is LBP HBP and MBP, how are they connected with COP of the system?

Answer:

Classification	Evaporating Temperature	Application Examples
LBP	-31° F through 14° F -35° C through -10° C	Freezers, island coolers & refrigerators
L/MBP	5° F through 32° F -15° C through 0° C	Self-service & beverage displays
HBP	32° F through 59° F 0° C through 15° C	Dehumidifiers, wine coolers & drinking fountains