BHARTIYA SKILL DEVELOPMENT UNIVERSITY

Registration No.: .....

School of RAC Skills

Session: 2021-22 (Summer Semester)

B. Voc. 1st Semester,

2nd In Sem. Examination

Course Code: RAC1101 **Time: 1 Hour**

Course Name: Basics of RAC **Max. Marks: 20**

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

Section – A

05X01 = 05 Marks

Q.1) A body named _____ is setup for international acceptance in English?

a) Conference for SI
b) General conference in weights and measures
c) General unit
d) Unit and measures International

Q.2) Vacuum pressure is?

a) Pressure above 1atm
b) Pressure below 1atm
c) Pressure below atmospheric pressure.
d) a & c options

Q.3) How many Fundamental units are there?

a) 5
b) 6
c) 7
d) 8

Q4) Tera has Power of

a) 10^{24}
b) 10^{14}
c) 10^{12}
d) 10^{34}

Q5) System and surrounding are separated by _____?

a) Boundary
b) Fence
c) Power
d) Border

Section – B

03X02 = 06 Marks

Q. 1 Name and explain types of system?

Q. 2 Write the unit conversion for following Length?

a) 25 cm into meter
b) 200 mm into meter
b) 2 inches into cm
d) 10 cm into inch

Q. 3 Define enthalpy and entropy.

Section – C

03X03 = 09 Marks

Q. 1 Explain the major components of VCR cycle

Q. 2 Convert the following temperature to the scale

a) 15° celsius to F
b) 32 F into °C
c) 50 K into °Celsius
d) 104 F into K

Q. 3 What sub-cooled liquid and super heated vapor?

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School of RAC Skills

I Semester, 2nd In-Sem. Examination

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

ANSWER KEY

Time: 1 Hour

Course Code: RAC1101

Max. Marks: 20

Course Name: Basic of Refrigeration

Section – A

05X01 = 05 Marks

1. A) Pressure
2. C) Gravity
3. B) Sensible
4. C) Boiling Point
5. A) boundary

Section – B

03X02 = 06 Marks

Q. 1 Explain the first 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,

$\oint W = J \oint Q$, 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

Q. 2 Explain internal energy and energy in transit.

- In thermodynamics, energy can be in two forms:

i. Energy in transit (motion/transfer)

ii. Energy in storage.

- Work and heat interactions are the forms of energy in transit, observed at boundaries.

Internal energy is the energy in storage.

Q. 3 Define enthalpy and entropy.

Answer:

Difference Between Enthalpy and Entropy

Enthalpy	Entropy
Enthalpy is a kind of energy	Entropy is a property
It is the sum of internal energy and flows energy	It is the measurement of the randomness of molecules
It is denoted by symbol H	It is denoted by symbol S
It was termed by a scientist named Heike Kamerlingh Onnes	It was termed by a scientist named Rudolf Clausius
It unit is Jmol−1Jmol−1	It unit is JK−1JK−1

Section – C

03X03 = 09 Marks

Q. 1 What are various intensive properties and extensive properties explain with example.

Answer:

Intensive Properties : these are independent of mass in the system, e.g. Temperature and Pressure

2. Extensive Properties : these are related to mass. e.g. Volume, energy, etc.

Specific extensive (per unit mass) are intensive properties.

e.g. specific volume = volume/mass.

Q. 2 Explain the thermodynamic equilibrium.

A system is said to be in a state of thermodynamic equilibrium when there is no change in any macroscopic property is registered, if system is isolated from its surroundings. Thermodynamic mainly studies the properties of physical systems that are found in equilibrium states.

A system will be in a state of thermodynamic equilibrium, if conditions for the following three types of equilibrium are satisfied:

Mechanical equilibrium

Chemical equilibrium

Thermal equilibrium

Q. 3 What are reversible and irreversible processes?

Answer:

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

Irreversible process :- The process is said to be an irreversible process if it cannot return the system and surroundings to their original conditions when the process is reversed.

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School of **RAC Skills**

I Semester, 2nd In-Sem. Examination

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

Time: 1 Hour

Max. Marks: 20

Course Code: RAC1102

Course Name: Domestic RAC Appliances

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. Which of the following is known as heart of VCRS?
   a) Compressor
   b) Condenser
   c) Expansion Valve
   d) Evaporator
2. Which type of condenser is used in domestic refrigerator?
   a) Forced air cooled
   b) Natural air cooled
   c) Water cooled
   d) Evaporative type
3. Convert 7 Kw into BTU.
   a) 12000
   b) 24000
   c) 6000
   d) 30000
4. Convert 10 Inches into Millimeter.
   a) 254
   b) 25.4
   c) 2.54
   d) 0.254
5. Which type of joint a Flare is?
   a. Permanent
   b. Temporary
   c. Both a and b
   d. None of the above

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Section – B

03X02 = 06 Marks

1. Define the term Measurement. What is the difference between measuring and gauging?
2. What do you understand by least count of a measuring instrument?
3. Draw the flow diagram of inspecting system.

Section – C

03X03 = 09 Marks

1. Draw a neat sketch of vernier caliper and label the part's name.
2. A vernier caliper with least count 0.05 mm and minimum measurable value on main scale is 1 mm. Find the total number of divisions on secondary scale.
3. A micrometer has 50 divisions on its secondary scale and least count is 0.01 mm. Find the minimum measurable value on main scale.

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School of **RAC Skills**

I Semester, 2nd In-Sem. Examination

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

Course Code: RAC1102 **Time: 1 Hour**

Course Name: Domestic RAC Appliances **Max. Marks: 20**

Instruction:

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

Section – A

05X01 = 05 Marks

1. Which of the following is known as heart of VCRS?
   a) Compressor
2. Which type of condenser is used in domestic refrigerator?

   b) Natural air cooled

3. Convert 7 Kw into BTU.

   b) 24000

4. Convert 10 Inches into Millimeter.
   a) 254
5. Which type of joint a Flare is?

   b) Temporary

Section – B

03X02 = 06 Marks

1. Define the term Measurement. What is the difference between measuring and gauging?

   Measurement: The action of measuring something by comparing measured value with standard measuring device.

   Measuring: It provides the result with numerical value and measuring units.

   Gauging: It doesn't provide the result with numerical value and measuring units instead it provides a subjective approximation for result.

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2. What do you understand by least count of a measuring instrument?

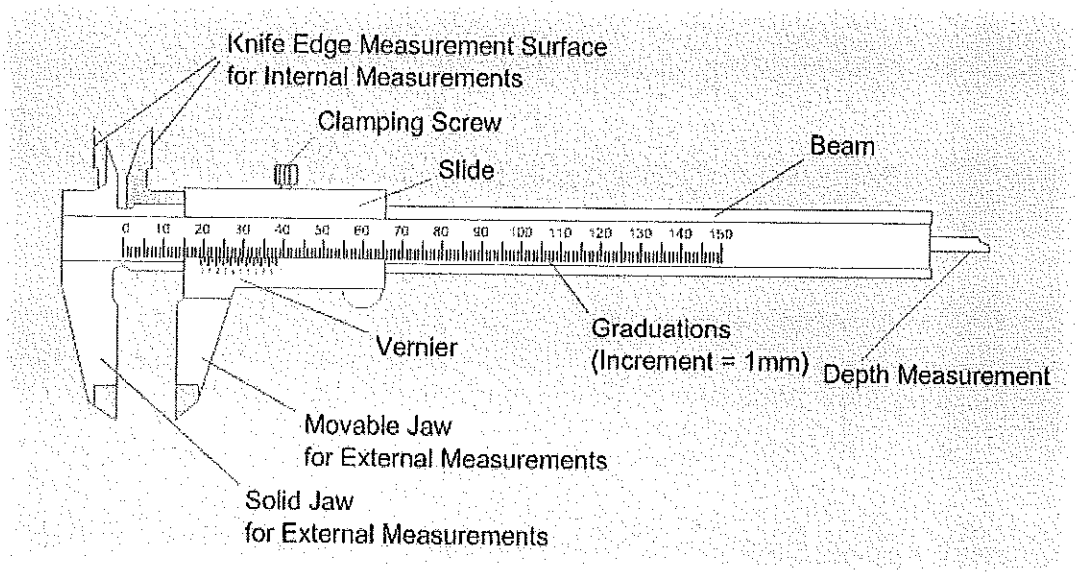
   Answer: Least count of any measuring tool gives the information about how much small value can be measured with that particular measuring tool. It tells about the precision of a measuring tool.

3. Draw the flow diagram of inspecting system.

Section – C

03X03 = 09 Marks

1. Draw a neat sketch of vernier caliper and label the part's name.



2. A vernier caliper with least count 0.05 mm and minimum measurable value on main scale is 1 mm. Find the total number of divisions on secondary scale.

   Solution:

   Least Count = (Minimum measurable value on main scale)/ (total number of divisions on secondary scale)

   Hence, 0.05 = 1/X

   X = 20 ans.

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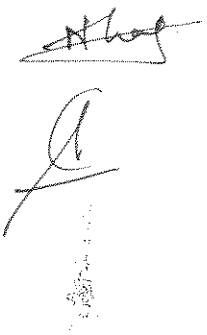
3. A micrometer has 50 divisions on its secondary scale and least count is 0.01 mm. Find the minimum measurable value on main scale.

Solution:

Least Count = (Minimum measurable value on main scale)/ (total number of divisions on secondary scale)

Hence, 0.01 = X/50

X = 0.5 mm ans.



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School of RAC Skills

I Semester, 2nd In-Sem. Examination

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

Course Code: RAC1103 Time: 1 Hour

Course Name:RAC Electrical,Electronics & Instrumentation -I Max. Marks: 20

Instruction:

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

Set - B

Section – A

05X01 = 05 Marks

1. Direction of current is measured by which measuring device :

   a. Multimeter.
   b. Galvanometer
   c. Ammeter
   d. Volmeter

2. Voltmeter is connected in ?

   a. Series.
   b. Parallel
   c. Diagonally
   d. None

3. Faraday law of induction explains the working principle of ?

   e. Transformers
   f. Motors
   g. Generators
   h. All of the above

4. Kirchoff voltage law is also called ?

a. First law

b. Second law

c. None of the above

d. All of the above

5. Kirchoff current law is also called ?

d. First law

e. Second law

f. None of the above

g. All of the above

Section – B

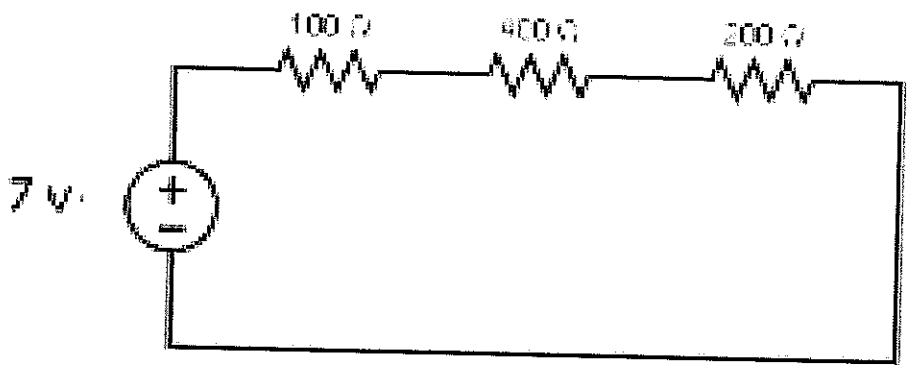
03X02 = 06 Marks

1. Explain faraday's first law.
2. Explain faraday's second law.
3. Explain watt's law.

Section – C

03X03 = 09 Marks

1. Explain Kirchoff's first and second law.
2. What is series and parallel connection of a circuit.
3. Calculate the total resistance,power,current in each circuit..



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School of RAC Skills

I Semester, 1st In-Sem. Examination

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

ANSWER KEY

Course Code: RAC1103 Time: 1 Hour

Course Name: RAC Electrical,Electronics & Instrumentation-I Max. Marks: 20

Section – A

05X01 = 05 Marks

1. Direction of current is measured by which measuring device :

   b. Galvanometer

2. Voltmeter is connected in ?

   b. Parallel.

3. Faraday law of induction explains the working principle of ?

   d. Both a and b

4. Kirchhoff voltage law is also called ?

   b. Second law.

5. Kirchhoff current law is also called ?

   a. First law

Section – B

03X02 = 06 Marks

1. Explain faraday's first law.

   ANSWER: Faraday first law states that all the currents entering and leaving the junction is same.

2. Explain faraday's second law.

ANSWER: Faraday second law states that the summ of all voltages in a circuit is equsl to zero.

3. Explain Watt's Law

ANSWER: Similar to Ohm's law, Watt's law states the relationship between power (watts), current and voltage.

$P = VI$ or $P = I^2 R$

Section – C

03X03 = 09 Marks

1. Explain Kirchoff's first and second law.

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

The algebraic sum of ALL the currents entering and leaving a junction must be equal to zero as: Σ IIN = Σ IOUT.

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

The algebraic sum of ALL the potential differences around the loop must be equal to zero as: $\Sigma V = 0$

2. What is series and parallel connection of a circuit.

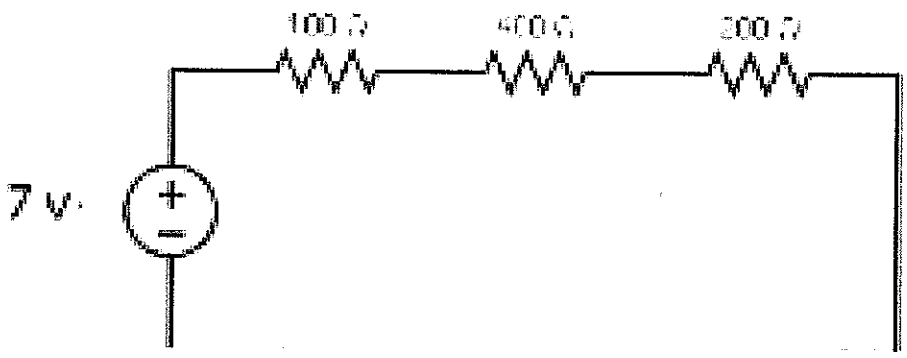
Answer: A circuit composed solely of components connected in series is known as a series circuit.
A circuit composed solely of components connected in parallel is known as a parallel circuit

2. Calculate the total resistance,power,current in each circuit...

Answer: Total Resistance = R1+R2+R3

Current = V/Rt

Power = Vxl



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BHARTIYA SKILL DEVELOPMENT UNIVERSITY

School of Refrigeration& Air-Conditioning Skills

I Semester, 2nd In-Sem. Examination

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

Course Code: RAC1104 Time: 1 Hour

Course Name: RAC Materials and Joining process Max. Marks: 20

Instruction: Attempt all

Section – A

05X01 = 05 Marks

Q1. Oxidizing flame has Oxygen & Acetylene in _____ amount?

a) Same b) Excess

c)Less d) More

Q2. To braze a steel base metal with copper _____ is used in filler?

a) Ag Silver b) Au gold

c) Steel d) Copper

Q3. Temperature of reducing flame is_____?

a)3000 b) 3200

c)3500 d)400

Q4. The commonly used flux for brazing is_____?

a) Resin b) Borax

c) Nh_4cl d) Aluminum dust

Q5. The function of flux is to _____?

a) Dissolve oxides when heating the work b) Prevent the spelter from melting too quickly

c) Increase the fluidity of brazing process d) All of the above

Section – B

03X02 = 06 Marks

Q6. Draw the flow chart for classification of Engineering materials?

Q7. What are the Advantages of brazing?

Q8. Label the below diagram with correct number order?

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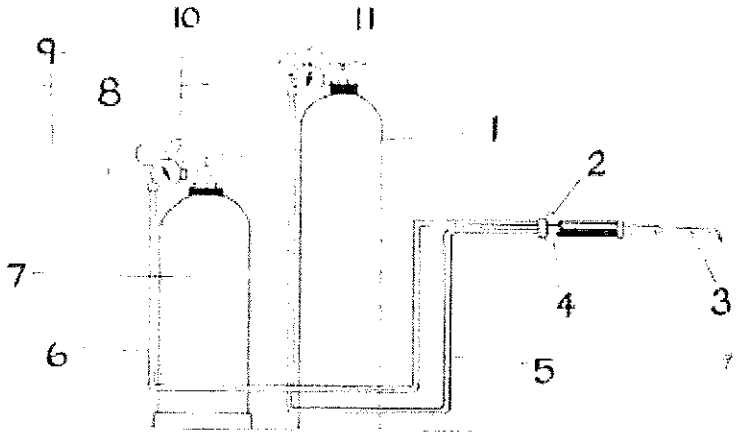
OXYACETYLENE EQUIPMENT



Section – C

03X03 = 09 Marks

Q9. Draw & explain the types of brazing flames?

Q10. Write in details about brazing Flux and its usage?

Q11. Explain in detail about Brazing temperatures with proper diagram?

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School of Refrigeration& Air-Conditioning Skills

I Semester, 2nd In-Sem. Examination

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

Course Code: RAC1104 Time: 1 Hour

Course Name: RAC Materials and Joining process Max. Marks: 20

Instruction: Attempt all

Section – A

05X01 = 05 Marks

Q1. Oxidizing flame has Oxygen _____ amount as compared to acetylene?

d) More

Q2. To braze a steel base metal with copper _____ is used in filler?

a) Ag Silver

Q3. Temperature of reducing flame is_____?

a)3000

Q4. The commonly used flux for brazing is_____?

b) Borax

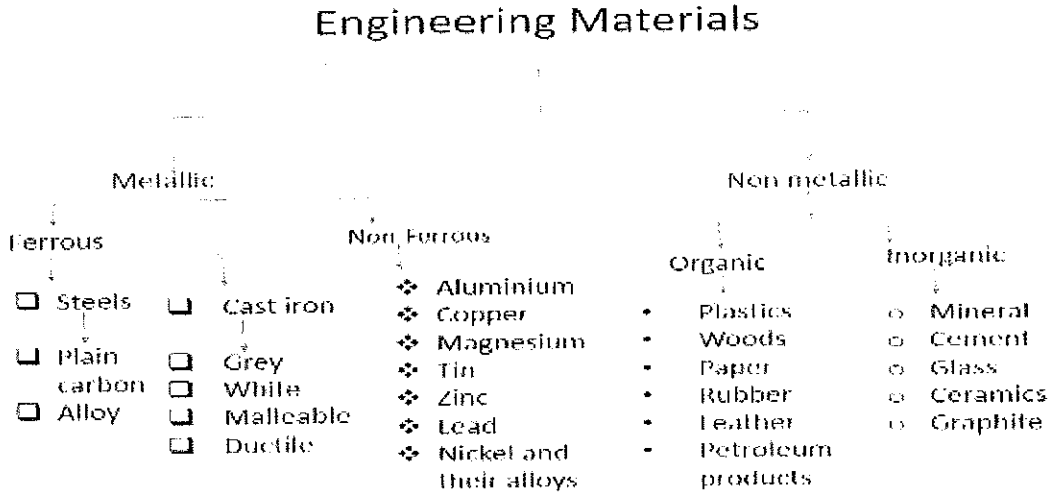
Q5. The function of flux is to _____?

d) All of the above

Section – B

03X02 = 06 Marks

Q6. Draw the flow chart for classification of Engineering materials?



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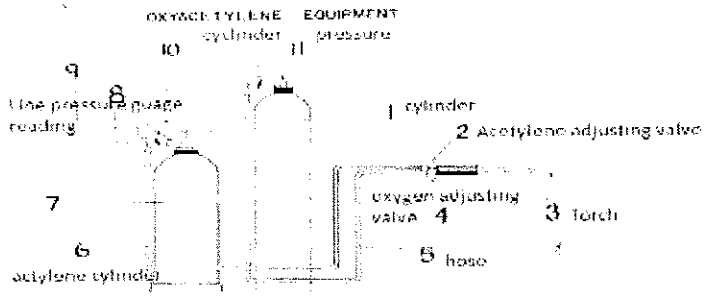
Q7. What are the Advantages of brazing?

A7.

1. Dissimilar metals can be joined.
2. Good for very thin metal joints
3. Metal with different thickness can be joined easily.
4. Thermal stresses not produced in the work piece -no wrapping.

Q8. Label the below diagram with correct number order?

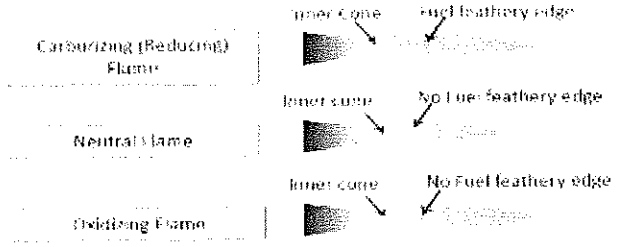


Section – C

03X03 = 09 Marks

Q9. Draw & explain the types of brazing flames?

- **Neutral flame (3200°C):** Acetylene (C_2H_2) and O_2 are mixed in equal amounts and burn at the tip of the welding torch. Inner cone gives 2/3rd of heat whereas the outer envelope provides 1/3rd of the energy.
- **Reducing flame (3000°C):** Excess amount of acetylene is used, giving a reducing flame. Combustion of acetylene is incomplete (greenish) between the inner cone and the outer envelope. Good for brazing aluminum alloys, high carbon steels.
- **Oxidizing flame (3400°C):** Excess amount of O_2 is used, giving an oxidizing flame. Good for welding brass.



Q10. Write in details about brazing Flux and its usage?

A10 Flux is an extra chemical agent applied to reduce mainly the heating stresses and Oxygen by making and envelope on the Materials applied following are function of flux

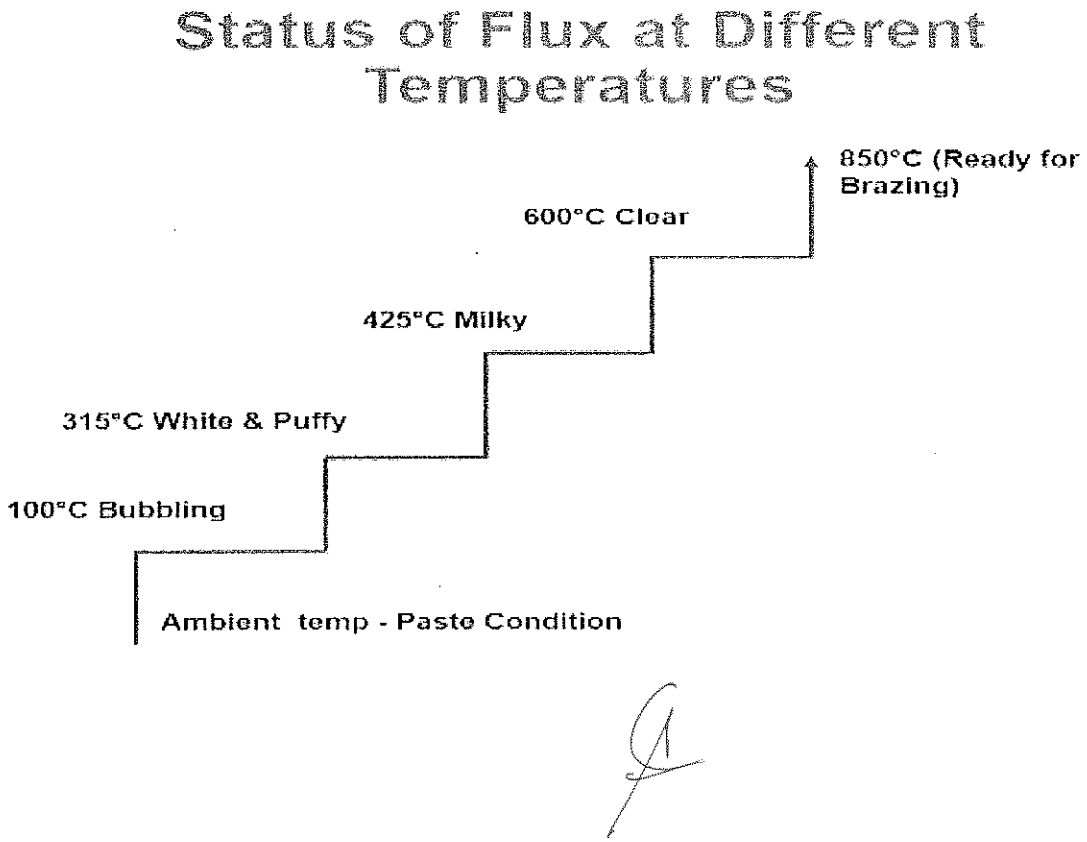
1. It clears the surface of the metal.

2. Provides fluidity to the filler to flow.
3. Removes atmospheric oxygen and gives shiny Surface

Q11. Explain in detail about Brazing temperatures with proper diagram?

A11. The following are the temperature range of brazing with a limit of 450 to below 1000 degree Celsius.

If we need to join the two materials with same thickness of metal heating and temperature for flux and filler both varies.



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Registration No.: .....

School of RAC Skills

Session: 2021-22 (Summer Semester)

B. Voc. Program, 1st Semester

2nd In-Sem. Examination

Course Code: RAC1105 **Time: 1 Hour**

Course Name: RAC Systems Component and Performance **Max. Marks: 20**

Instruction: Attempt all questions

Section – A

05X01 = 05 Marks

1. Input and output of a refrigerator are 200W and 300W respectively, which statement is true about this refrigerator?
   a. Refrigerator performing well.
   b. Low COP
   c. Fault is refrigerator design
   d. All of above
2. In_____, the fluid motion occurs by natural factors such as buoyancy and difference is the density of hot and warm fluid layers.
   a. Radiation
   b. Natural Convection
   c. Freezing
   d. Condensation
3. Air cooled condenser are rarely made in size over _____ due to higher discharge pressure,
   a. 4 TR
   b. 5 TR
   c. 6 TR
   d. None of the above.
4. "Advantage: No fan used to air flow." This statement is related to:
   a. Cooling tower
   b. Force air cooled condenser
   c. Natural air cooled condenser
   d. None of the above.
5. Ratio of cooling capacity to the input power for refrigerator is 4, what is the COP of the system?
   a. Need more data to calculate
   b. 4
   c. 3

d. 5

Section – B

03X02 = 06 Marks

1. What is the relationship between pressure and temperature?
2. Explain fin type heat exchanger.
3. Explain shell and tube heat exchanger

Section – C

4. Why do we use PH chart? Explain all lines in PH chart
5. Explain all types of air cooled heat exchangers.
6. Calculate the rate of heat rejection to cool 60 Kg of water from 40C to -10 C in 5 hours.

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Registration No.: .....

School of RAC Skills

Session: 2021-22 (Summer Semester)

B. Voc. Program, 1st Semester

2nd In-Sem. Examination

Course Code: RAC1105 **Time: 1 Hour**

Course Name: RAC Systems Component and Performance **Max. Marks: 20**

Instruction: Attempt all questions

Answer Sheet

Section – A

05X01 = 05 Marks

1. Input and output of a refrigerator are 200W and 300W respectively, which statement is true about this refrigerator?
   a. Refrigerator performing well.
2. In_____, the fluid motion occurs by natural factors such as buoyancy and difference is the density of hot and warm fluid layers.
   b. Natural Convection
3. Air cooled condenser are rarely made in size over _____ due to higher discharge pressure,
   b. 5 TR
4. "Advantage: No fan used to air flow." This statement is related to:
   c. Natural air cooled condenser
5. Ratio of cooling capacity to the input power for refrigerator is 4, what is the COP of the system?
   b. 4

Section – B

03X02 = 06 Marks

1. What is the relationship between pressure and temperature?

Answer:

The pressure of a given amount of gas is directly proportional to its absolute temperature, provided that the volume does not change (Amontons's law). The volume of a given gas sample is directly proportional to its absolute temperature at constant pressure (Charles's law).

2. Explain fin type heat exchanger.

Answer:

Natural Convection: -

In natural convection, the fluid motion occurs by natural factors such as buoyancy and difference is the density of hot and warm fluid layers.

Since the fluid velocity associated with natural convection is relatively low, the heat transfer coefficient encountered in natural convection is also low.

- Plate and tube evaporator and
- Wire and tube heat Condenser

Forced Convection: -

In forced convection, the fluid is forced to flow over a surface or in a tube by external means such as a pump or fan

3. Explain shell and tube heat exchanger

   It is the most common type of heat exchanger in oil refineries and other large chemical processes, and is suited for higher-pressure applications. As its name implies, this type of heat exchanger consists of a shell (a large pressure vessel) with a bundle of tubes inside it. One fluid runs through the tubes, and another fluid flows over the tubes (through the shell) to transfer heat between the two fluids. The set of tubes is called a tube bundle, and may be composed of several types of tubes: plain, longitudinally finned, etc. There are also multiple arrangements possible, including U-tube, fixed tube, or a floating head configuration.

Section – C

4. Why do we use PH chart? Explain all lines in PH chart

Pressure enthalpy is used to study the VCR cycle, refrigeration effect, amount of refrigerant circulated, compressor power etc. can be calculated by using PH chart.

a) Temperature line
b) Pressure lines
c) Enthalpy line
d) Entropy line
e) Specific volume line

5. Explain all types of air cooled condenser.

   - Extended fin type
   - Wire tube condenser
   - Bare tube

   Natural Convection: -

   In natural convection, the fluid motion occurs by natural factors such as buoyancy and difference is the density of hot and warm fluid layers.

   Since the fluid velocity associated with natural convection is relatively low, the heat transfer coefficient encountered in natural convection is also low.

   Forced Convection: -

In forced convection, the fluid is forced to flow over a surface or in a tube by external means such as a pump or fan

6. Calculate the rate of heat rejection to cool 60 Kg of water from 40C to -10 C in 5 hours.