Registration No.: .....

BHARTIYA SKILL DEVELOPMENT UNIVERSITY

School of Refrigeration & Air conditioning Skills

1st Semester, 1st In-Sem. Examination

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

Course Code: RAC-1101 **Time: 1 Hour**

Course Name: Basic of Refrigeration and Air-Conditioning **Max. Marks: 20**

Instruction: Attempt all questions.

Section – A

05X01 = 05 Marks

Q.1) In One inch how many Millimeters?
a) 25.4mm
b) 2.54cm
c) 250cm
d) 0.25cm

Q.2) Convert 0 degree Celsius into Fahrenheit:
a) 212
b) 32
c) 21.2
d) 0.21

Q.3) In which direction does heat flow?
a) From a cold substance to cold substance
b) Up
c) Down
d) From a warm substance to a cold substance

Q.4) What is the units of density?
a) Kg/m^3
b) m^3/s
c) m^3/kg
d) T

Q.5) How many Fundamental units are there?
a) 5
b) 6
c) 7
d) 8

Section – B

03X02 = 06 Marks

Q2.1 What is the property of fluid? Write down any four properties of the fluid.

Q2.2 what is zeroth Law of thermodynamics?

Q2.3 Define heat and write the English and Si unit for the same?

Section – C

03X03 = 09 Marks

Q3.1 What is pressure? Write down different pressure units used in RAC.

Explain with neat sketch absolute pressure, gauge pressure, and vacuum pressure.

Q3.2 Calculate the pressure exerted on the floor by 150 kg person with a total foot imprint area of 50 m^2?

Q3.3) Derive the Fundamental unit of the following physical Quantity?

a) Displacement b) Force

c) Velocity d) Acceleration

Registration No.: .....

BHARTIYA SKILL DEVELOPMENT UNIVERSITY

School of Refrigeration & Air conditioning Skills

1st Semester, 1st In-Sem. Examination

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

Course Code: RAC-1101 **Time: 1 Hour**

Course Name: Basic of Refrigeration and Air-Conditioning **Max. Marks: 20**

Section – A

05X01 = 05 Marks

A1 a)25.4mm

A.2) b)32 F

A.3) d) From a warm substance to a cold substance

A.4) a) Kg/m^3 Q.5) How many Fundamental units are there?

A.5 c) 7

Section – B

A3.1 Mechanics: The oldest physical science that deals with both stationary and moving bodies under the influence of forces.

Statics: The branch of mechanics that deals with bodies at rest.

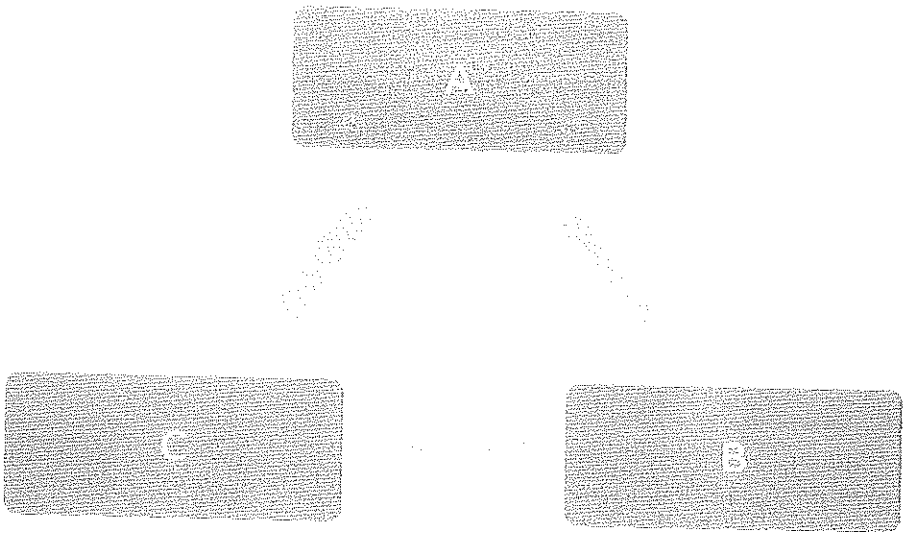
Dynamics: The branch that deals with bodies in motion.

Fluid mechanics: The science that deals with the behavior of fluids at rest (*fluid statics*) or in motion (*fluid dynamics*), and the interaction of fluids with solids or other fluids at the boundaries.

Fluid dynamics: Fluid mechanics is also referred to as fluid dynamics by considering fluids at rest as a special case of motion with zero velocity.

A2.2 When a body A is in thermal equilibrium with a body B and separately with a body C, then B and C will be in thermal equilibrium

BHARTIYA SKILL DEVELOPMENT UNIVERSITY



with each other

A2.3 Heat is referred to as energy required to raise the temperature of water

1gram by 1 degree Celsius

UNITS ARE 1 joule and 1 btu

Btu is the amount of energy required to raise the temperature by 1 Fahrenheit

Section C

Answer 3.1 Pressure is the amount of force applied at right angles to the surface of an object per unit area. The symbol for it is p or P.

P= F/A

The SI unit is 'pascals (Pa)'. 1 Pa = 1N/m2

Where P= pressure, F= magnitude of

Normal force

A= is the area of the surface on contact

Pascal, Bar, PSI are used in rac

A3.2 Calculate the pressure exerted on the floor by 150 kg person with a total foot imprint area of 50 m^2?

$= \frac{150*10}{50} = 30\ N/M^2$

A3.3) Derive the Fundamental unit of the following physical Quantity?

a) Displacement-Displacement = Length $[M^0L^1T^0]$

b) Force= mass * acceleration $[M^1L^2T^{-2}] = \frac{Kg*m^2}{Sec^2}$ newton

BHARTIYA SKILL DEVELOPMENT UNIVERSITY

c) Velocity

$\underline{\text{LENGTH}} = [M^0L^1T^{-1}]$ METRE/SEC

TIME

d) Acceleration $= [M^0L^1T^{-2}]$ METRE /SEC^2

by Hardik Verma

Registration No.: .....

BHARTIYA SKILL DEVELOPMENT UNIVERSITY

School of RAC Skills

I Semester, 1st In-Sem. Examination

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

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

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

SET-A

Instruction:

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

Section – A

05X01 = 05 Marks

1. Which one is the measuring instrument?

   a. Filler gauge
   b. Wire gauge
   c. Try square
   d. Measuring tape

2. Which one is the gauging instrument?

   a. Vernier caliper
   b. Micrometer
   c. Try square
   d. None of the above

3. Room ACs are based on which cycle?

   a. Carnot Cycle
   b. Reversed Carnot cycle
   c. Atkinson Cycle
   d. All of the above

4. Value of 35 micron in Millimeter (mm) is:

   a. 35 mm
   b. 350 mm
   c. 3.5 mm
   d. None of the above

5. By which component, pressure reduction is done in your room AC?

   a. Compressor
   b. Condenser
   c. Expansion device
   d. None of the above

Section – B

03X02 = 06 Marks

1. Define the term measurement. How measuring is different from gauging.
2. You have a Vernier Caliper of least count 0.02 mm. Minimum measurable value on main scale is 1 mm. Find out the total number of divisions on secondary scale.
3. Write down the classification of compressors.

Section – C

03X03 = 09 Marks

1. Describe the safety during AC work in detail.
2. Give the name of all the parts of a Vernier Caliper with the help of a neat sketch.
3. Explain all the processes take place in an air conditioning cycle through a neat sketch cycle.

Registration No.: .....

BHARTIYA SKILL DEVELOPMENT UNIVERSITY

School of RAC Skills

I Semester, 1st In-Sem. Examination

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

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

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

ANSWER KEY

SET-A

Instruction:

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

Section – A

05X01 = 05 Marks

1. Which one is the measuring instrument?

d. Measuring tape

2.Which one is the gauging instrument?

c. Try square

3. Room ACs are based on which cycle?

a. Carnot Cycle

4. Value of 35 micron in Millimeter (mm) is:

d. None of the above

5. By which component, pressure reduction is done in your room AC?

c. Expansion device

Section – B

03X02 = 06 Marks

1. Define the term measurement. How measuring is different from gauging.

   Solution: Measurement is comparing the obtained value with standard set of value. Gauging don't give any numerical value like measuring instrument.

2. You have a Vernier Caliper of least count 0.02 mm. Minimum measurable value on main scale is 1 mm. Find out the total number of divisions on secondary scale.

Solution: Least count (0.02) = 1/X

X = 50 Ans.

3. Write down the classification of compressors.

Classification of compressors

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

a) Based on the working principle:

i. Positive displacement type
ii. Roto-dynamic type

Positive displacement type

i. Reciprocating type
ii. Rotary type with sliding vanes (rolling piston type)
iii. Rotary screw type (twin-screw type)
iv. Orbital (Scroll) compressors

Roto-dynamic type

i. Radial flow type
ii. Axial flow type

b) Based on arrangement of compressor motor or external drive:

i. Open type
ii. Hermetic (or sealed) type
iii. Semi-hermetic (or semi-sealed) type

Section – C

03X03 = 09 Marks

1. Describe the safety during AC work in detail.

Answer:

1. Personal Safety

Hat

Safety shoes

Gloves

Glasses/Goggles

Ear muff

2. Electrical Safety

Electrical Shock

Lock out/Tag out

3. Mechanical Safety

Rotating and moving parts

Hot/Cold surface

Sharp objects

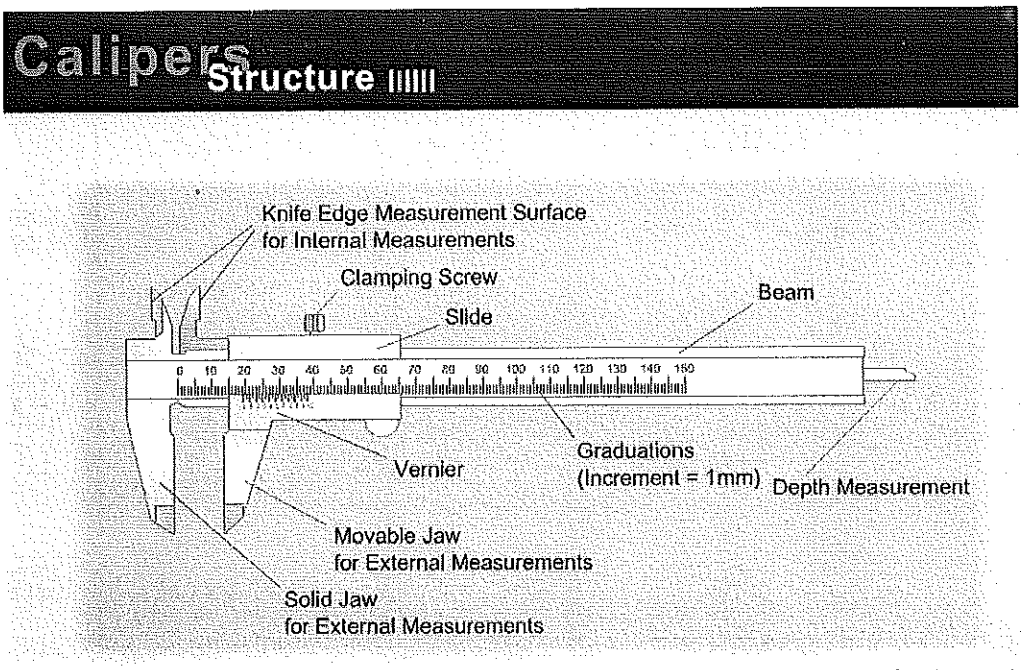
4. Refrigerant/Pressurized Gas Safety

Exposure to refrigerant

Refrigerant container

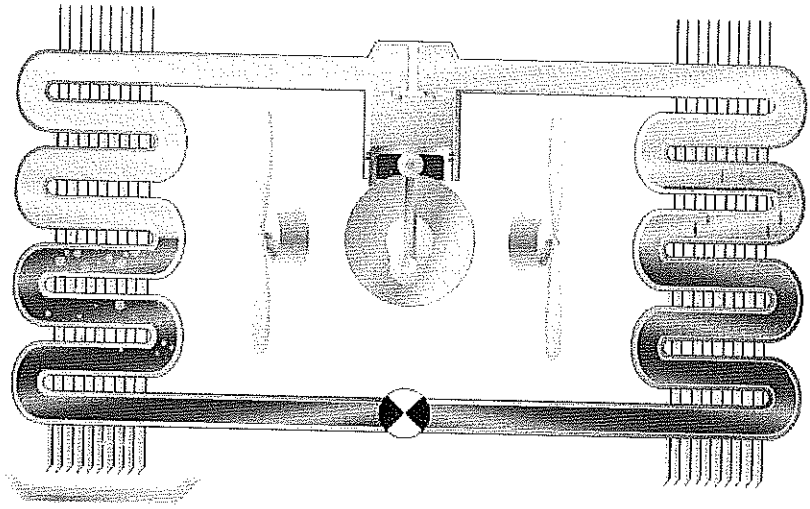
Refrigerant leakage

2. Give the name of all the parts of a Vernier Caliper with the help of a neat sketch.



3. Explain all the processes take place in an air conditioning cycle through a neat sketch cycle.

BHARTIYA SKILL DEVELOPMENT UNIVERSITY



Component	Inlet	Outlet
Compressor	Vapour	Vapour
Condenser	Vapour	Liquid
Expansion device	Liquid	Liquid
Evaporator	Liquid	Vapour

Registration No.: .....

BHARTIYA SKILL DEVELOPMENT UNIVERSITY

School of RAC Skills

I Semester, 1st In-Sem. Examination

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

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.

Section – A

05X01 = 05 Marks

1. What happens when magnet is at rest :

   a. No deflection
   b. Slight deflection
   c. Right deflection
   d. Left Deflection

2. Resistance is the?

   a. Oppose to electric current flow.
   b. Oppose to the work done
   c. Concentration of work
   d. Energy

3. Cables are used at

   a. Small and big industries
   b. Transmission lines
   c. Distribution lines
   d. All of the above

4. The direction of induced current can be determined by Fleming's .

a. Right hand rule
b. Left hand rule
c. resist change to power
d. Power

5. Vulcanised Indian rubber wire is suitable for?

a. Low voltage supply
b. Medium voltage supply
c. High voltage supply
d. Both a & b

Section – B

03X02 = 06 Marks

1. Explain the dependence of resistance on temperature.
2. Explain mutually induced emf.
3. Explain the weather proof wires.

Section – C

03X03 = 09 Marks

1. Describe Fleming's right hand rule in detail.
2. Write down a note on Kirchoff's second law.
3. What is T.R.S. Wire.

Registration No.: .....

BHARTIYA SKILL DEVELOPMENT UNIVERSITY

School of RAC Skills

I Semester, 1st In-Sem. Examination

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

ANSWER KEY

Time: 1 Hour

Course Code: RAC1103

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

Section – A

05X01 = 05 Marks

1. What happen when magnet is at rest:

   a. No Defelection

2. Resistance is the?

   a. oppose to electric current flow.

3. Cables are used at

   d. All of the above

4. The direction of induced current can be determined by Fleming's .

   a. Right Hand Rule

5. Vulcanised Indian Rubber wire is suitable for

   d. Both a & b

Section – B

03X02 = 06 Marks

1. Explain the dependence of resistance on temperature.

   ANSWER: Resistance depends on the geometry of a conductor as well as on what the conductor is made from, but it also depends on temperature. Thus, resistance generally increases with temperature.

For small temperature changes the resistivity varies linearly with temperature:

We often write this in terms of resistance instead: $R = R_O(1 + \alpha\Delta T)$

where a is the temperature coefficient of resistivity.

2. Explain Mutually induced emf.

ANSWER: The emf induced in a coil due to the change of flux produced by another neighbouring coil linking to it, is called **Mutually Induced emf.**

3. Explain the weather proof wires.

ANSWER: Weather proof wires are used outdoor i.e providing a service connection from overhead lines to building.

Section – C

03X03 = 09 Marks

1. Describe Fleming's right hand rule in detail.

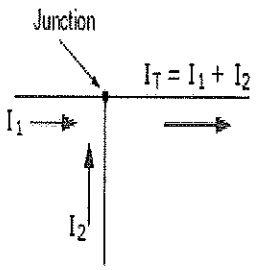
Answer : **Right Hand Rules**

Rule #1 determines the directions of magnetic force, conventional current and the magnetic field. Given any two of theses, the third can be found.

Using your right-hand: point your index finger in the direction of the charge's velocity (recall conventional current).
Point your middle finger in the direction of the magnetic field.
Your thumb now points in the direction of the magnetic force.

2. Write down a note on Kirchoff's first 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.

3. What is T.R.S. wire?

Answer: This type of wire ia a modification of Vulcanised Indian Rubber Wire. t consists of the ordinary rubber coated conductor with additional coating of sheath of tough rubber.

BHARTIYA SKILL DEVELOPMENT UNIVERSITY
Set-2

Registration No.: .....

School of RAC Skills

Session: 2020-21 (Summer Semester)

B. Voc. Program, 1st Semester,

1st In-Sem. Examination

Course Code: RAC-1104 **Time: 1 Hour**

Course Name: RAC materials and Joining Processes **Max. Marks: 20**

Instruction: (if any) NO

Section – A

05X01 = 05 Marks

1. Classifications of Joining process are:
   a) Welding and brazing
   b) Nuts and bolts
   c) Fasteners
   d) All of the above
2. Thickness of sheet metal various from:
   a) 0 to 6 mm
   b) 6-10 mm
   c) 10-15 mm
   d) 15-20 mm
3. Ductility is defined as:
   a) Ductility is characterized by a material's ability to be stretched into a wire
   b) Ductility is characterized by a material's ability to be not stretched into a wire
   c) Ductility is characterized by a material's ability to be equal stretched into a wire
   d) Ductility is characterized by a material's ability to be not equal stretched into a wire
4. Properties of metals are:
   a) Ductile
   b) Luster
   c) Malleable
   d) All of above
5. Properties of non-metals are:
   a) Non-ductile
   b) Non-luster
   c) Non-malleable
   d) All of above

Section – B

03X02 = 06 Marks

Q1 What is brazing? Why brazing is applied on copper material.

Q2 Write down definition of malleable and luster.

Q3 Differentiate between punching and Blanking sheet metal operations.

Section – C

03X03 = 09 Marks

Q1 Write down various physical properties of metal.

Q2 Write down various physical properties of non-metal.

Q3 Write down various safety precautions step during doing brazing?

BHARTIYA SKILL DEVELOPMENT UNIVERSITY
Set-2 Answer key

Registration No.: .....

School of RAC Skills **Answer key**

Session: 2020-21 (Summer Semester)

B. Voc. Program, 1st Semester,

1st In-Sem. Examination

Course Code: RAC-1104 **Time: 1 Hour**

Course Name: RAC materials and Joining Processes **Max. Marks: 20**

Instruction: (if any) NO

Section – A

05X01 = 05 Marks

1. Classifications of Joining process are:
   a) Welding and brazing
   b) Nuts and bolts
   c) Fasteners
   d) All of the above
2. Thickness of sheet metal various from:
   a) 0 to 6 mm
   b) 6-10 mm
   c) 10-15 mm
   d) 15-20 mm
3. Ductility is defined as:
   a) Ductility is characterized by a material's ability to be stretched into a wire
   b) Ductility is characterized by a material's ability to be not stretched into a wire
   c) Ductility is characterized by a material's ability to be equal stretched into a wire
   d) Ductility is characterized by a material's ability to be not equal stretched into a wire
4. Properties of metals are:
   a) Ductile
   b) Luster
   c) Malleable
   d) All of above
5. Properties of non-metals are:
   a) Non-ductile
   b) Non-luster
   c) Non-malleable
   d) All of above

Section – B

03X02 = 06 Marks

Q1 What is brazing? Why brazing is applied on copper material.

Brazing it is a process of joining two metal having temperature above 450 degree celcius because copper is a low melting temperature metal

Q2 Write down definition of malleable and luster.

Malleable: metals can be beaten into thin sheets with hammers

Luster metal can have a shiny surface

Q3 Differentiate between punching and Blanking sheet metal operations.

In a **punching operation**, they typically remove the smallest amount of material necessary from the original workpiece to minimize material waste. In contrast, **blanking** operations are most efficient when the maximum amount of material is removed from the workpiece

Section – C

03X03 = 09 Marks

Q1 Write down various physical properties of metal.

Metals are malleable, ductile, sonotrose, luster, good conductor of electricity and thermal conductivity.

Q2 Write down various physical properties of non-metal.

Non Metals are nonmalleable, nonductile, non sonotrose, non luster, not good conductor of electricity and thermal conductivity.

Q3 Write down various safety precautions step during doing brazing?

Alwys wear gooles, shoes, clothes, gloves, nonpoisonous material

BHARTIYA SKILL DEVELOPMENT UNIVERSITY

Registration No.: .....

School of RAC Skills

Session: 2020-21 (Summer Semester)

B. Voc. Program, 1st Semester,

1st In-Sem. Examination

Course Code: HVA-1105 **Time: 1 Hour**

Course Name: RAC Systems & Performance **Max. Marks: 20**

Instruction: (if any)

SET-A

Section – A

05X01 = 05 Marks

1. Convert 420 Degrees Fahrenheit to Celsius:
    a. 150
    b. 215
    c. 230
    d. 400
2. What is the value of absolute zero?
    a. -400°F
    b. -300°F
    c. -20 °F
    d. -460°F
3. Radiant heat can
    a. can travel through a vacuum.
    b. travel through space without heating it
    c. Both A & B
    d. None of the above.
4. Which of the following is not the temperature scale?
    a. Celsius
    b. Fahrenheit
    c. Kilometer
    d. Kelvin
5. What does BTU mean:
    a. British temperature Unit
    b. British Thermal Unit
    c. British Temperature Unified
    d. None of the above

Section – B

03X02 = 06 Marks

6. What is heat.
7. Explain Latent heat in few words.

8. What is the definition of pressure?

Section – C

03X03 = 09 Marks

9. What is the relationship between pressure and temperature?
10. What is the difference between sensible and latent heat?
11. What is convection. Explain in detail.

BHARTIYA SKILL DEVELOPMENT UNIVERSITY

Registration No.: .....

School of RAC Skills

Session: 2020-21 (Summer Semester)

B. Voc. Program, 1st Semester,

1st In-Sem. Examination

Course Code: HVA-1105 **Time: 1 Hour**

Course Name: RAC Systems & Performance **Max. Marks: 20**

Instruction: (if any)

SET-A

Section – A

05X01 = 05 Marks

1. B
2. D
3. C
4. C
5. B

Section – B

03X02 = 06 Marks

1. **Heat** is the form of energy that is transferred between systems or objects with different temperatures (flowing from the high-temperature system to the low-temperature system). Also referred to as **heat** energy or **thermal** energy. **Heat** is typically measured in Btu, calories or joules.
2. Latent heat (also known as latent energy or heat of transformation) is energy released or absorbed, by a body or a thermodynamic system, during a constant-temperature process — usually a first-order phase transition.
3. Pressure is defined as the physical force exerted on an object. The force applied is perpendicular to the surface of objects per unit area. The basic formula for pressure is F/A (Force per unit area). Unit of pressure is Pascals (Pa).

Section – C

03X03 = 09 Marks

4. The pressure of a given amount of gas held at constant volume is directly proportional to the Kelvin temperature. With an increase in temperature, the pressure will go up.
5. **Sensible heat** is the energy required to change the temperature of a substance with no phase change. The temperature change can come from the absorption of sunlight by the soil or the air itself. Or it can come from contact with the warmer air caused by release of latent **heat.** Latent heat (also known as latent energy or heat of transformation) is energy released or absorbed, by a body or a thermodynamic system, during a constant-temperature process — usually a first-order phase transition.

6. Convection is the transfer of heat due to the bulk movement of molecules within fluids, including molten rock. Convection includes sub-mechanisms of advection, and diffusion. Convection cannot take place in most solids because neither bulk current flows nor significant diffusion of matter can take place.