Duration: 3 hrs **Total Marks: 80**

A#1: The phenomenon in which liquids change into vapors at temperatures below their boiling point is called evaporation.

A#2: Chlorofluorocarbons or CFC's which are carbon compounds containing both fluorine and chlorine.

A#3: When liquids evaporate, they tend to absorb energy from their surrounding environment to regain the energy they lost during the evaporation process. This causes the surrounding environment to lose thermal energy and become cold.

(OR)

A#3:

Evaporation	**Boiling**
It is a surface phenomenon	It is a bulk phenomenon
It can occur at any temperature	It occurs only at a fixed temperature (boiling point)

A#4: Given:
The mass of salt (solute) in the solution = 50 grams
The mass of water (solvent) in the solution = 400 grams

We know that the mass percentage of a solution is given by ((mass of solute)/mass of solution)*100%

Mass of solution = mass of solute + mass of solvent = 50 grams + 400 grams = 450 grams

Therefore, mass percentage = (50 grams / 450 grams) * 100%
= 11.1%

(OR)

A#4: A homogeneous mixture of two or more substances is called a solution. The components of a solution are (i) solute and (ii) solvent.

A#5: The large, membranous organelles found in most of the plant cells are called plastids. The types of plastids are - (i) chromoplasts (ii) leucoplasts.

A#6: (i) they have a metallic luster or shine.

(ii) they are good conductors of heat and electricity.

(iii) they are quite malleable.

(OR)

A#6:

Mixtures	**Compounds**
Elements or compounds mix to form a mixture and no new compounds are formed	Compounds are formed from the reaction of two elements
Have a variable composition	Have a fixed composition
Exhibits properties similar to those of the constituents	Exhibits different properties when compared to the constituents.

A#7: Ions are the charged species which can exist either as a single atom with a charge or as a group of atoms with a net charge. Examples for ionic compounds - (i) Calcium Oxide, (ii) Sodium Chloride.

A#8: (i) most of the alpha particles passed through the thin gold foil.

(ii) some of the alpha particles were deflected by small angles.

(iii) one in 12,000 alpha particles were rebounded.

A#9: Tissues are a group of cells which are similar in structure and give functional efficiency to multicellular organisms. The two main types of plant tissues are - (i) meristematic tissues and (ii)permanent tissues.

A#10: (i) in the first case, initial velocity, u = 0.
Terminal velocity, v = 60 m/s
Time = 10 seconds.

We know that a = (v-u)/t
Therefore, acceleration of the Batmobile, a = (60 m/s - 0 m/s)/10 s = 6 m/s^2

In the second case, initial velocity, u = 60 m/s
Terminal velocity, v = 10m/s
Time = 1 second.

Acceleration of the batmobile = (10 m/s - 60 m/s)/1 s
= -50 m/s^2

A#11:
Given, initial velocity, u = 20 m/s
Final velocity, v = 30 m/s
Mass of the bike, m = 200kg

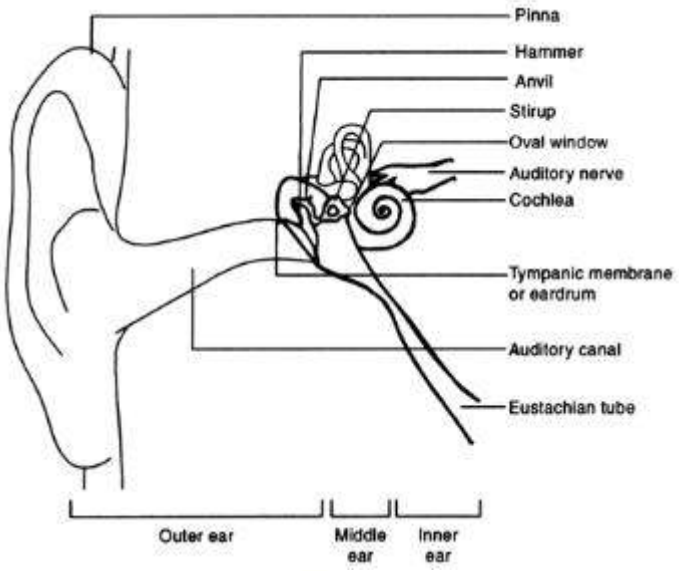
Now, the initial and final kinetic energies of the bike can be calculated as:
$E_{ki} = (½)mu^2$
$E_{ki} = (½)\ (200kg)\ (20\ m/s)^2$
$= 40{,}000\ J$

Similarly, the final kinetic energy of the bike can be calculated as:
$E_{kf} = (½)mv^2$
$E_{kf} = (½)\ (200kg)\ (30\ m/s)^2$
$= 90{,}000\ J$

Therefore, the total amount of work which needs to be done = change in kinetic energy

$= E_{kf} - E_{ki}$
$= 90{,}000J - 40{,}000J$
$= 50{,}000J$

A#12:

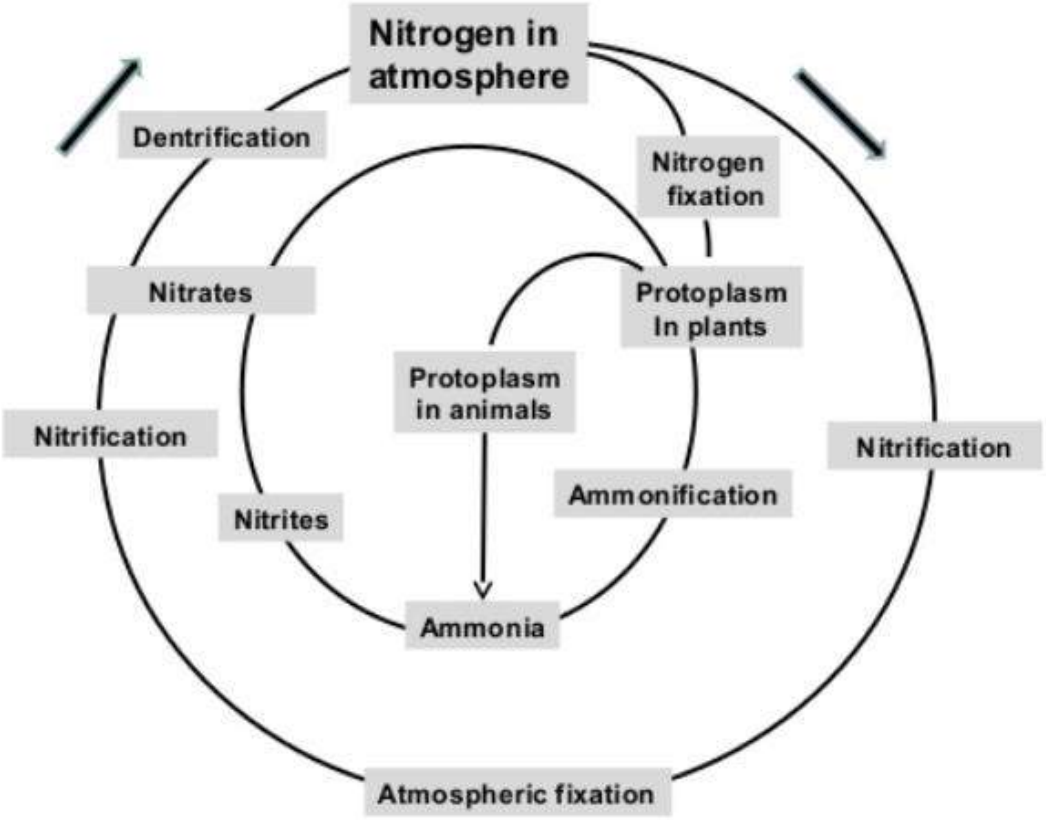


A#13: acute diseases are diseases which last for short periods of time. An example of an acute disease would be the common cold.
Chronic diseases are diseases which can last for long periods of time. Some chronic diseases even last for the entire lifetime of the organism. An example of chronic disease would be asthma.

(OR)

A#13: Infectious diseases are diseases that are caused by infectious agents such as viruses, bacteria, worms, etc. examples for infectious diseases include the common cold and AIDS. Infectious diseases can spread through - (i) insects such as mosquitoes, (ii) consumption of infected food.

A#14:



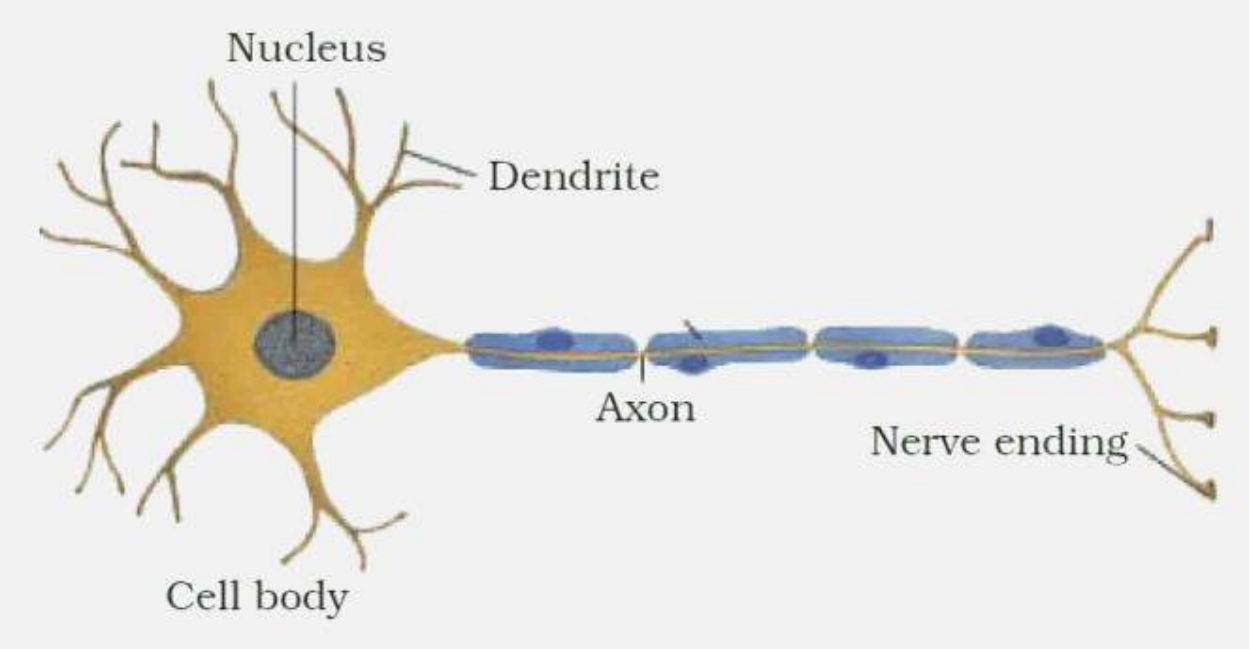
A#15: (i) Higher Yield: in order to increase the productivity of the crop.
(ii) Improved Quality: in order to improve specific qualities sought in a specific crop. E.g. protein quality in pulses.
(iii) Improve Biotic and Abiotic Resistance: in order to increase the resistance of the crop to biotic factors such as insects and diseases, and abiotic factors such as heat and salinity.

A#16: (i) Matter is made up of tiny particles which are called atoms. These atoms participate in chemical reactions.
(ii) atoms are indivisible and cannot be created or destroyed in chemical reactions.
(iii) atoms of the same element have exactly the same mass and chemical properties.
(iv) atoms of two different elements differ in mass and chemical properties.
(v) atoms can combine in whole-number ratios to form molecules.

(OR)

A#16: (i) (a) Na_2O
(b) Na_2S
(c) $Mg(OH)_2$
(ii) (a) Aluminium Sulfate
(b) Potassium Nitrate

A#17: Neurons are the cells that form nervous tissues. These cells are highly specialized in the transmission of stimulus from one part of the body to another. They make up the nervous tissue found in the brain, spinal cord, and nerves.



A#18: (i) The 7 chief groups in the hierarchy of classification groups are:

- Kingdom
- Phylum/Division
- Class
- Order
- Family
- Genus
- Species

(ii) the 5 kingdoms into which all living organisms are classified are:

- Monera
- Protista
- Fungi
- Plantae
- Animalia

A#19: (i) Newton's Laws of Motion:

- Newton's First Law: An object will continue to be in a state of rest or of uniform motion along a straight line unless acted on by an external, unbalanced force.
- Newton's Second Law: The rate of change of momentum of a given object is proportional to the applied unbalanced force in the direction of the force.
- Every action has an equal and opposite reaction and they act on 2 different bodies.

(ii) Given, u = 5 m/s
v= 10m/s
t = 1s
m= 10kg

Now, from the mathematical formulation of the second law of motion, we have:

$F = ma = m(v-u)/t$

Therefore, $F = 10kg\ (10m/s - 5m/s)/1s$
$F = 10kg\ (5\ m/s^2)$
$F = 40N$

A#20: The Universal law of gravitation states that every object in the universe attracts every other object in the universe with a force which is directly proportional to the product of the masses of the objects, and is inversely proportional to the square of the distance between them.

Mathematical equation:
From the universal law of gravitation, we know that the gravitational force is directly proportional to the product of the masses of the objects.

i.e. $F \propto m_1 * m_2$

We also know that the force is inversely proportional to the square of the distance between the objects.

i.e. $F \propto 1/d^2$

Therefore, $F \propto (m_1 * m_2)/d^2$

$F = (G * m_1 * m_2)/d^2$

Where G is the universal gravitation constant.
The universal law of gravitation is important because it is responsible for:

- The motion of planets around the sun
- The force that keeps us bound to the earth.

A#21:

Potential Energy	**Kinetic Energy**
It is the type of energy which is present in a body due to the property of its state.	It is the type of energy which is present in a body due to the property of its motion.
It cannot be transferred	It can be transferred from one body to another.
It is proportional to the velocity of the object	It is proportional to the height/distance of the object
It is non-relative to the environment of the object	It is relative to the environment of the object.
It can be expressed by the formula $E= ½\ mv^2$	It can be expressed by the formula E=mgh.

A#22: Dogs can be classified as:

- Class: Mammalia
- Order: Carnivora
- Family: Canidae
- Genus: Canis
- Species: Familiaris

A#23: A car driving on a straight road is under acceleration which is in the direction of motion. When the brakes are applied on the car, it is under acceleration which is against the direction of motion.

A#24: (i)While traveling in a vehicle, the jerk we feel when brakes are applied suddenly is because of inertia.
(ii) while pushing a shopping cart which is full, suddenly stopping it may cause the objects in the cart to fall off because of inertia acting on the objects.

(OR)

A#24: Examples wherein Newton's third law can be observed are:
(i) the recoil of a gun due to the forward facing force on the bullet.
(ii) even walking is an example of Newton's third law. As we push the ground away from us, the ground pushes us forward.

A#25: (i) the weightless feeling that arises while swimming is due to the buoyant force.
(ii) while drawing water from a well, the bucket feels lighter when immersed in water due to buoyant forces acting on it.

A#26: Some jet planes can travel at speeds faster than the speed of sound. The jet planes also produce sound. Since their speed is faster than the speed of sound, they produce shock waves in air. These shock waves can shatter window glass, which is why the windows are reinforced. The air pressure variation due to these shock waves produces loud sounds which are referred to as sonic booms.

A#27: Rainwater, if not drained away properly, can become a breeding ground for mosquitoes. Mosquitoes are carriers of diseases such as dengue and malaria, hence these diseases may arise in the areas where rainwater puddles are left unattended.