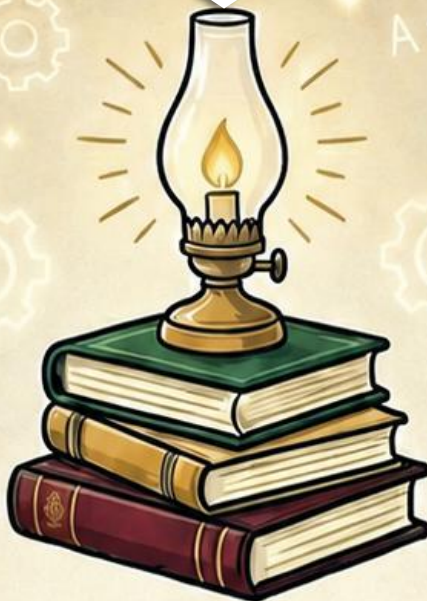




$$A = \frac{m}{(m^2 + c)^2}$$



NIOS PYQ's SOLUTIONS

$$\sqrt{a} = bc^2$$

$$\sqrt{h-x^2}$$

PREVIOUS YEARS' QUESTIONS & ANSWERS



APRIL 2026

Your Path to Success

(SET – A)

Q1. Due to a balanced force acting on an object:

- (A) Speed changes
- (B) Direction of motion changes
- (C) There is no change in motion
- (D) Weight increases

Answer: (C) There is no change in motion

Q2. The value of g on the Moon is approximately:

- (A) 9.8 m/s^2
- (B) One-sixth of the value of g on Earth
- (C) Double the value of g on Earth
- (D) Zero

Answer: (B) One-sixth of the value of g on Earth

Q3. Which of the following is not a fundamental physical quantity?

- (A) Mass
- (B) Electric current
- (C) Work
- (D) Temperature

Answer: (C) Work

Q4. Which of the following is not a system of units?

- (A) FPS
- (B) MKS
- (C) CGS
- (D) kWh

Answer: (D) kWh

Q5. According to the Law of Octaves proposed by John Newlands:

- (A) When elements are arranged according to increasing atomic mass, the properties of every eighth element are similar to those of the first element.
- (B) When elements are arranged according to increasing atomic number, the properties of elements repeat after every seventh element.
- (C) Elements are arranged into groups and periods on the basis of valency.
- (D) Only metals show periodicity.

Answer: (A) When arranged according to increasing atomic mass, the properties of every eighth element are similar to the first element



Q6. Which alkali is present in whitewash?

- (A) Sodium hydroxide (NaOH) (B) Calcium hydroxide (Ca(OH)_2)
(C) Potassium hydroxide (KOH) (D) Ammonium hydroxide (NH_4OH)

Answer: (B) Calcium hydroxide (Ca(OH)_2)

Q7. The distribution of electrons in the K, L, and M shells of Phosphorus (atomic number 15) is:

- (A) $K = 2, L = 8, M = 5$ (B) $K = 2, L = 7, M = 6$
(C) $K = 2, L = 8, M = 6$ (D) $K = 2, L = 6, M = 7$

Answer: (A) $K = 2, L = 8, M = 5$

Q8. Thermal inversion occurs when:

- (A) Warm air rises above cold air.
(B) Cold air rises above warm air.
(C) Warm air remains above cold air, trapping pollutants.
(D) There is no temperature difference in the layers of air.

Answer: (C) Warm air remains above cold air, trapping pollutants

Q9. Nitrogen fixation is the process of converting:

- (A) Ammonia into nitrates
(B) Atmospheric nitrogen into useful compounds of nitrogen
(C) Nitrates into nitrogen gas
(D) Nitrites into proteins

Answer: (B) Conversion of atmospheric nitrogen into useful compounds of nitrogen

Q10. When the distance between two point charges is kept the same and the magnitude of their charge is doubled, how does the electrostatic force acting between them change?

- (A) It becomes half. (B) It becomes double.
(C) It becomes four times. (D) It remains the same.

Answer: (C) It becomes four times

Q11. In a series circuit, the current flowing through each resistor:

- (A) Is different for each resistor.
(B) Is the same for all resistors.
(C) Is zero.
(D) Depends on the potential difference across each resistor.

Answer: (B) Is the same for all resistors



Q12. A stone at the top of a mountain has maximum potential energy. This energy converts into kinetic energy when:

- (A) The stone is stationary.
- (B) The stone is falling.
- (C) The stone is tied to a tree.
- (D) The stone is kept on the ground.

Answer: (B) The stone is falling

Q13. The work done by a force is zero when:

- (A) The force is applied in the direction of motion.
- (B) The force is applied opposite to the direction of motion.
- (C) The applied force is perpendicular to the displacement.
- (D) The displacement is along the direction of the force.

Answer: (C) The applied force is perpendicular to the displacement

Q14. A major problem with non-biodegradable waste is that:

- (A) It decays quickly.
- (B) It does not decay/rot quickly.
- (C) It increases nutrients in the soil.
- (D) It is always harmless.

Answer: (B) It does not decay/rot quickly

Q15. Excessive growth usually occurs due to eutrophication (over-nourishment) of:

- (A) Zooplankton
- (B) Algae
- (C) Fungi
- (D) Fish

Answer: (B) Algae

Q16. Rickets is mainly caused by the deficiency of:

- (A) Vitamin C
- (B) Vitamin D
- (C) Calcium
- (D) Iron

Answer: (B) Vitamin D

Q17. The cause of a heart attack is:

- (A) Blockage of an artery
- (B) Weakness of heart muscles
- (C) Low blood pressure
- (D) High number of white blood cells

Answer: (A) Blockage of an artery

Q18. Fill in the blanks: The CGS system is based on three fundamental quantities: _____ for length, _____ for mass, and second for time.:

Centimetre (for length); Gram (for mass)



Q19. Match the substances given in Column A with their correct acids in Column B:

Column A (Substances):

- (1) Vinegar
- (2) Lemon juice

Column B (Acids):

- (A) Acetic acid
- (B) Citric acid
- (C) Hydrochloric acid
- (D) Sulphuric acid

Answers: (1) Vinegar → (A) Acetic acid; (2) Lemon juice → (B) Citric acid

Q20. Write 'True' (T) for correct statements and 'False' (F) for incorrect statements:

- (1) Ionic bonds are formed by the transfer of electrons.: **True**
- (2) Covalent bonds usually conduct electricity in water.: **False**

Q21. Read the passage and answer the following questions:

According to Archimedes' Principle, when an object is fully or partially submerged in a fluid, an upward force acts on it, called the buoyant force. This force is equal to the weight of the fluid displaced by the object. Whether an object floats or sinks depends on how much buoyant force acts on it compared to its own weight.

(1) A stone sinks when placed in water. According to Archimedes' Principle, which of the following statements best explains this situation?

- (a) The stone displaces less water than its own weight.
- (b) The buoyant force is greater than the weight of the stone.
- (c) Water forcefully pushes the stone upward.
- (d) The weight of the stone is equal to the water displaced.

Answer: (a) The stone displaces less water than its own weight

(2) A block of wood floats on top of water. What does this tell you about the buoyant force acting on it?

- (a) This force is less than the weight of the wooden block.
- (b) This is equal to the weight of the wooden block.
- (c) This force is greater than the weight of the wooden block.
- (d) This has no relation to the weight of the wooden block.

Answer: (b) This is equal to the weight of the wooden block



Q22. Write 'True' (T) for correct statements and 'False' (F) for incorrect statements:

- (1) The image formed by a plane mirror is real and inverted.: **False**
- (2) The image formed by a plane mirror is located behind the mirror at the same distance as the object is from the mirror.: **True**

Q23. Fill in the blanks: In a concave lens, the image distance is always _____ and the image formed is _____. : **negative (or: less than the object distance, on the same side as the object); virtual, erect, and diminished**

Q24. Match the devices given in Column-A with the appropriate type of energy transformation given in Column-B:

Column-A (Device):

- (1) Solar panel
(2) Bicycle dynamo

Column-B (Energy Transformation):

- (a) Mechanical → Electrical
(b) Electrical → Light and Heat
(c) Solar → Electrical
(d) Chemical → Mechanical

Answers: (1) Solar panel → (c) Solar → Electrical; (2) Bicycle dynamo → (a) Mechanical → Electrical

Q25. Fill in the blanks: A _____ is stretched between the _____ fingers of a bat, which helps it fly.: **thin membrane/skin (patagium); elongated (fingers)**

Q26. [Based on a diagram showing genetic engineering / recombinant DNA technology steps]

(1) What is the first step of genetic engineering?

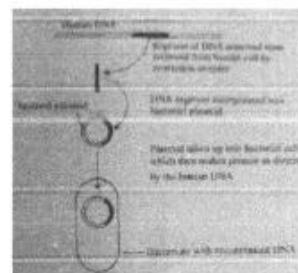
- (A) Plasmid taken by bacteria
(B) Inserting a segment of DNA into a plasmid
(C) Extraction of human DNA from the cell using restriction enzyme
(D) Bacteria making protein

Answer: (C) Extraction of human DNA from the cell using restriction enzyme

(2) Which enzyme is used to cut a segment of DNA at a specific location on the cell?

- (A) Ligase
(B) Restriction enzyme
(C) DNA polymerase
(D) Ribosome

Answer: (B) Restriction enzyme



Q27. Read the following passage and answer the questions given:

A pond is a small water body where plants, animals, and microorganisms live together. Sunlight, water, and air are abiotic components that help organisms survive in the pond. Green plants and algae make their own food, while fish and frogs depend on them for energy. Bacteria and fungi decompose dead plants and organisms, recycling nutrients.

(1) If decomposers were absent in the pond, what long-term changes would occur?

- (A) Nutrients would not be recycled, causing a decrease in plant growth.
- (B) The number of fish would increase rapidly.
- (C) Sunlight in the water would increase.
- (D) Frogs would produce more offspring.

Answer: (A) Nutrients would not be recycled, causing a decrease in plant growth

(2) A student observes that algae in a pond grow rapidly when they receive sunlight for several days. Which abiotic factor is responsible for this?

- (A) Water temperature
- (B) Availability of sunlight
- (C) Dissolved oxygen in water
- (D) Presence of decomposers

Answer: (B) Availability of sunlight

Q28. Read the following passage and answer the questions: (1×5 = 5 marks)

In a physics laboratory, students were experimenting with two types of generators. One generator has a rotating coil connected to two slip rings, while the other has a rotating coil connected to a commutator. The students measured the current using an ammeter and observed that in the first generator, the frequency of current reversal depends on the speed of rotation of the coil. The teacher explained that the first type is called an AC (Alternating Current) generator, while the second type is called a DC (Direct Current) generator.

(1) Why does the generator with slip rings produce alternating current?

- (A) The coil is stationary.
- (B) The slip rings reverse the direction of the current at regular time intervals.
- (C) The slip rings maintain the current in one continuous direction.
- (D) The internal battery reverses the current.

Answer: (B) The slip rings reverse the direction of the current at regular time intervals



(2) What is the main role of the commutator in a DC generator?

- (A) To rotate the coils
- (B) To reverse the current at regular time intervals
- (C) To maintain the current in one direction
- (D) To measure the current

Answer: (C) To maintain the current in one direction

(3) Which generator would be more suitable for charging a battery?

- (A) AC generator
- (B) DC generator
- (C) AC or DC
- (D) None of these

Answer: (B) DC generator

(4) In an AC generator, the frequency of current reversal depends on:

- (A) The number of turns in the coil
- (B) The speed of rotation of the coil
- (C) The resistance of the coil
- (D) The type of commutator used

Answer: (B) The speed of rotation of the coil

(5) Why are AC generators preferred for power plants?

- (A) AC voltage cannot be increased or decreased.
- (B) AC voltage can be easily increased or decreased using a transformer.
- (C) AC current never changes direction.
- (D) AC generators are smaller compared to DC generators.

Answer: (B) AC voltage can be easily increased or decreased using a transformer

Q29. How many covalent bonds can a carbon atom form and why?

Answer: A carbon atom has an atomic number of 6, so its electronic configuration is 2,4, meaning it has 4 electrons in its outermost (valence) shell. Since carbon needs 4 more electrons to complete its octet (achieve 8 electrons in the outer shell, following the octet rule), and since carbon can neither easily lose 4 electrons (which would require too much energy) nor easily gain 4 electrons (which would also require too much energy), it achieves stability by sharing its 4 valence electrons with other atoms. Therefore, a carbon atom can form 4 covalent bonds, because it has 4 valence electrons available for sharing, and sharing (rather than complete transfer) is energetically the most favorable way for carbon to achieve a stable octet configuration.

OR



Mention one property of graphite and state one use of graphite because of this property.

Answer: Property: Graphite is a good conductor of electricity. Unlike other forms of carbon (like diamond), graphite has a layered structure where each carbon atom is bonded to only 3 other carbon atoms, leaving one electron free (delocalized) to move and conduct electricity.

Use based on this property: Because graphite conducts electricity, it is used to make electrodes in dry cells and electrolytic cells (electrolysis).

Q30. Write about two properties of gold, due to which jewelry can be made from it.

Answer: Property 1: Malleability. Gold is highly malleable, meaning it can be beaten into extremely thin sheets without breaking, allowing jewelers to shape it into intricate and delicate designs.

Property 2: Ductility. Gold is highly ductile, meaning it can be drawn into thin wires, which allows jewelers to create fine chains, filigree work, and detailed patterns in jewelry.

(Additional relevant properties: Gold is also highly resistant to corrosion/tarnishing, meaning it retains its shine and does not react with air or moisture over time, making it ideal for long-lasting jewelry.)

Q31. (a) Describe J.J. Thomson's Plum Pudding Model of the atom.

Answer: According to J.J. Thomson's Plum Pudding Model (also called the "watermelon model"), an atom is considered to be a sphere of uniformly distributed positive charge, with negatively charged electrons embedded within it, much like plums (or seeds) are embedded within a pudding (or watermelon). The positive and negative charges are equal in magnitude, making the atom as a whole electrically neutral.

(b) Give one limitation of this model.

Limitation: This model could not explain the results of Rutherford's alpha-particle scattering experiment, particularly the deflection of some alpha particles at large angles (and the very small fraction bouncing straight back), which suggested the existence of a small, dense, positively charged nucleus at the center of the atom something the Plum Pudding Model did not account for since it assumed the positive charge was spread uniformly throughout the atom.

OR

Write any two limitations of Mendeleev's Periodic Table.

Answer: Limitation 1: The position of hydrogen was not clearly defined, as it resembles both alkali metals (Group 1) and halogens (Group 17) in its properties, making it difficult to assign it a fixed place in the table.



Limitation 2: Isotopes of the same element (having the same atomic number but different atomic masses) could not be given separate positions in Mendeleev's table, since the table was arranged based on increasing atomic mass, not atomic number.

Q32. What are indicators? Name any one natural indicator and mention the source from which it is extracted.

Answer: Indicators are substances that change color when they come into contact with acidic or basic (alkaline) solutions, and are used to determine whether a given solution is acidic, basic, or neutral.

Natural indicator: Litmus

Source: Litmus is extracted from lichens (a specific type of plant-like organism formed from a symbiotic association of fungi and algae).

(Other valid examples: Turmeric extracted from the turmeric plant/rhizome, turns red in basic solutions; China rose (Gudhal) the petals of the China rose flower are used as a natural indicator.)

Q33. Write two adaptations of desert organisms to reduce water loss.

Answer: Adaptation 1: Many desert plants (like cacti) have their leaves modified into spines (thorns), which greatly reduces the surface area available for transpiration (water loss through leaves), thereby conserving water.

Adaptation 2: Desert animals like the kangaroo rat produce very concentrated urine and dry feces, minimizing the amount of water lost from their bodies during excretion.

Q34. Write two points of difference between a grazing food chain and a detritus food chain.

Answer: Difference 1: A grazing food chain begins with green plants (producers) that are consumed by herbivores, which are then consumed by carnivores. A detritus food chain, on the other hand, begins with dead organic matter (detritus), which is broken down by decomposers.

Difference 2: A grazing food chain depends directly on solar energy captured by producers through photosynthesis. A detritus food chain does not depend directly on solar energy; instead, it depends on the energy stored in dead organic matter that already exists in the ecosystem.

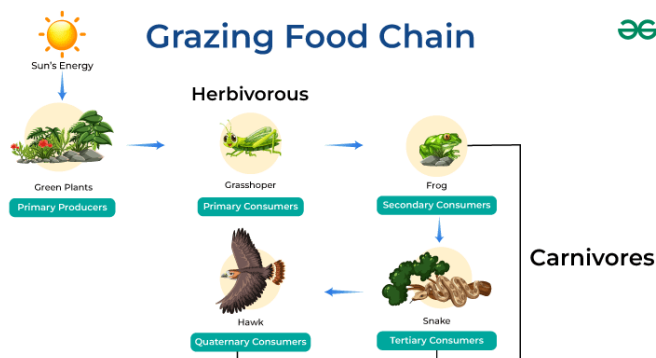
OR

What is a grazing food chain? Give an example.

Answer: A grazing food chain is a type of food chain that begins with green plants (producers), which are consumed by herbivores (primary consumers), which are in turn consumed by carnivores (secondary and tertiary consumers). Energy flows from one trophic level to the next through direct consumption of living organisms.

Example: Grass → Grasshopper → Frog → Snake → Eagle





Q35. Element X has an atomic number of 11 and element Y has an atomic number of 17.

(a) Write the electronic configuration of both elements.

Answer: For element X (atomic number 11): Total electrons = 11

Electronic configuration: $K = 2, L = 8, M = 1$ (i.e., 2,8,1)

For element Y (atomic number 17): Total electrons = 17

Electronic configuration: $K = 2, L = 8, M = 7$ (i.e., 2,8,7)

(b) What type of bond will form between X and Y?

Answer: Element X (with configuration 2,8,1) has only 1 electron in its outermost shell, so it will easily lose this electron to form a stable cation, X^+ .

Element Y (with configuration 2,8,7) has 7 electrons in its outermost shell, so it will easily gain 1 electron to complete its octet, forming a stable anion, Y^- .

Since X loses an electron and Y gains an electron, an ionic (electrovalent) bond will form between X and Y, due to the transfer of electrons and the resulting electrostatic attraction between the oppositely charged ions.

(c) Write the formula of the compound formed.

Answer: Since X forms a +1 ion (X^+) and Y forms a -1 ion (Y^-), they combine in a 1:1 ratio.

Formula of the compound: XY

(Note: Element X with atomic number 11 is Sodium (Na), and element Y with atomic number 17 is Chlorine (Cl). The compound formed is Sodium Chloride, $NaCl$.)

OR

How does the tendency of alkali metals to lose electrons change down a group, and why?

Answer: As we move down the group of alkali metals (Group 1), the tendency to lose electrons increases.

Reason: As we go down the group, a new electron shell is added at each step, causing the atomic size (atomic radius) to increase. This means the outermost (valence) electron is located progressively



farther from the nucleus. Additionally, the effect of increasing numbers of inner electron shells causes a "screening effect" (shielding effect), which reduces the effective nuclear attraction experienced by the outermost electron. As a result, the valence electron is held less tightly by the nucleus as we go down the group, making it progressively easier to remove (lose) this electron, hence increasing the tendency to lose electrons and to form positive ions.

Q36. A cartridge of mass 20 g is fired from a 5 kg gun in the horizontal direction with a velocity of 400 m/s. Calculate the recoil velocity of the gun.

Answer: By the Law of Conservation of Momentum, the total momentum of the system (gun + cartridge) before firing must equal the total momentum after firing.

Before firing, both the gun and the cartridge are at rest, so the total initial momentum = 0.

Let the mass of the cartridge $m_1 = 20 \text{ g} = 0.02 \text{ kg}$ (converting grams to kilograms)

Let the mass of the gun $m_2 = 5 \text{ kg}$

Velocity of the cartridge $v_1 = 400 \text{ m/s}$ (in the forward direction)

Let the recoil velocity of the gun be v_2 (this will be in the opposite direction, hence negative)

By conservation of momentum: $m_1 v_1 + m_2 v_2 = 0$

$$(0.02)(400) + (5)(v_2) = 0$$

$$8 + 5v_2 = 0$$

$$5v_2 = -8$$

$$v_2 = \frac{-8}{5} = -1.6 \text{ m/s}$$

The negative sign indicates that the recoil velocity of the gun is in the direction opposite to the direction of the cartridge's motion. The recoil velocity of the gun is 1.6 m/s, directed opposite to the direction in which the cartridge was fired.

Q37. (a) Mention the nature of non-metallic oxides.

Answer: Non-metallic oxides are generally acidic in nature. When dissolved in water, they form acids. For example, oxides of non-metals like sulphur, carbon, and nitrogen react with water to produce acidic solutions, and they typically turn blue litmus paper red.

(b) Write the balanced chemical equation for the reaction of sulphur trioxide with water.

Sulphur trioxide reacts with water to form sulphuric acid: $\text{SO}_3 + \text{H}_2\text{O} \rightarrow \text{H}_2\text{SO}_4$

OR



Write the name of the ore from which Hg (Mercury) is extracted. Write its balanced chemical equation.

Answer: Mercury is extracted from the ore called Cinnabar (Mercury(II) sulphide, HgS).

The extraction process involves roasting the ore in air, which converts mercury sulphide into mercury oxide, and then further heating decomposes it to give mercury metal:

Step 1 (Roasting): $2HgS + 3O_2 \rightarrow 2HgO + 2SO_2$

Step 2 (Decomposition on further heating): $2HgO \rightarrow 2Hg + O_2$

(Often, the overall reaction is directly written as: $HgS + O_2 \rightarrow Hg + SO_2$)

Q38. (a) How is ethanol formed from glucose? Write the balanced chemical equation for this reaction.

Answer: Ethanol is formed from glucose through the process of fermentation, in which glucose is broken down by the action of enzymes present in yeast (a microorganism), in the absence of oxygen (anaerobic conditions), to produce ethanol and carbon dioxide.

The balanced chemical equation for this reaction is: $C_6H_{12}O_6 \xrightarrow{\text{yeast (zymase)}} 2C_2H_5OH + 2CO_2$

(b) Write one use of ethanol.

Answer: Ethanol is used as a solvent in the preparation of medicines, tinctures (like tincture of iodine), cosmetics, and perfumes.

Q39. What is meant by galvanization? Express one use of it.

Answer: Galvanization is the process of coating iron or steel objects with a thin protective layer of zinc metal, in order to prevent them from rusting (corrosion). The zinc layer acts as a protective barrier, preventing moisture and oxygen from directly reaching the iron surface, and even if the zinc coating is scratched, the zinc preferentially corrodes (sacrificial protection) instead of the iron underneath.

Use: Galvanization is commonly used to protect iron pipes, iron sheets (used in roofing), nails, and other iron/steel products used in construction and water supply systems from rusting, thereby extending their lifespan.

Q40. Give the definitions of the terms Oviparous (egg-laying), Viviparous (giving birth to live young), and Hermaphrodite (bisexual), giving one example of each.

Answer: Oviparous (Egg-laying): Oviparous organisms are those that reproduce by laying eggs, and the embryo develops outside the mother's body, within the egg, before hatching.

Example: Hens (birds), and reptiles like lizards and snakes are oviparous.



Viviparous (Giving birth to live young): Viviparous organisms are those in which the embryo develops inside the mother's body (typically in a uterus), receiving nourishment directly from the mother, and the offspring is born alive (fully developed), rather than hatching from an egg outside the body.

Example: Humans and most other mammals, such as cows and dogs, are viviparous.

Hermaphrodite (Bisexual): Hermaphrodite organisms are those that possess both male and female reproductive organs within the same individual, meaning a single organism can produce both sperm and eggs.

Example: Earthworms and tapeworms are examples of hermaphroditic organisms.

Q41. A patient's kidneys have stopped functioning properly. Explain how dialysis is helpful in such a condition and why it is important.

Answer: When a patient's kidneys fail to function properly, they lose the ability to filter waste products (like urea), excess salts, and excess water from the blood. If left untreated, these waste products and fluids would build up to dangerous, potentially fatal levels in the body.

Dialysis is a medical procedure that artificially performs the function of the kidneys by filtering the patient's blood through a machine (dialysis machine/artificial kidney). During dialysis, the patient's blood is passed through a dialyzer containing a semi-permeable membrane, on the other side of which is a dialyzing fluid with a composition similar to normal blood plasma (but without the waste products). Due to the concentration gradient, waste products such as urea and excess salts diffuse out of the blood, across the semi-permeable membrane, and into the dialyzing fluid, while useful substances remain in the blood or are appropriately balanced.

Why it is important: Dialysis is critically important because it removes the toxic waste products and excess fluids that accumulate in the blood when the kidneys fail, preventing these substances from reaching lethal levels in the body. Without dialysis, a person with complete kidney failure would not survive, as the buildup of waste products would poison the body and disrupt the balance of essential salts and fluids necessary for normal bodily function.

OR

Write the names of three types of neurons and their functions.

Answer: 1. Sensory Neurons: These neurons carry nerve impulses from receptors (sense organs, such as skin, eyes, ears) to the central nervous system (brain and spinal cord). Their function is to transmit sensory information (such as touch, pain, temperature, sound) toward the brain and spinal cord for processing.



2. Motor Neurons: These neurons carry nerve impulses away from the central nervous system (brain and spinal cord) to the muscles or glands (effectors). Their function is to transmit instructions from the brain/spinal cord to cause muscles to contract or glands to secrete, resulting in a response.

3. Relay Neurons (Interneurons/Association Neurons): These neurons are located within the central nervous system (brain and spinal cord) and connect sensory neurons to motor neurons. Their function is to relay and process information between sensory and motor neurons, especially important in reflex actions, allowing for quick coordination of responses.

Q42. Answer the following questions regarding Washing Soda:

(a) What is washing soda? Write its chemical formula.

Answer: Washing soda is the common name for hydrated sodium carbonate, a chemical compound used for washing and cleaning purposes, as well as in the glass, soap, and paper industries.

Chemical formula: $Na_2CO_3 \cdot 10H_2O$

(b) How is washing soda made from baking soda?

Answer: Washing soda is prepared from baking soda (sodium bicarbonate, $NaHCO_3$) as follows: Baking soda is heated, which decomposes it to form sodium carbonate, along with water and carbon dioxide: $2NaHCO_3 \rightarrow Na_2CO_3 + H_2O + CO_2$. The resulting sodium carbonate (Na_2CO_3) is then recrystallized (dissolved in water and allowed to crystallize) with 10 molecules of water of crystallization, to obtain washing soda ($Na_2CO_3 \cdot 10H_2O$).

(c) Write any two important uses of washing soda.

Answer: Use 1: Washing soda is used in the manufacture of glass, as it is one of the key raw materials in the glass-making industry.

Use 2: Washing soda is used as a cleaning agent (in the manufacture of soaps and detergents), and also for washing clothes, as it can help remove permanent hardness of water by precipitating calcium and magnesium ions.

OR

Answer the questions given regarding Bleaching Powder:

(a) What is bleaching powder? Write its chemical formula.

Answer: Bleaching powder is a compound formed by the action of chlorine gas on dry slaked lime (calcium hydroxide). It is commonly used for bleaching purposes, and is also known as calcium oxychloride. **Chemical formula:** $CaOCl_2$



(b) How is bleaching powder made? Write its chemical reaction.

Answer: Bleaching powder is manufactured by passing chlorine gas over dry slaked lime (calcium hydroxide). The chemical reaction is: $\text{Ca(OH)}_2 + \text{Cl}_2 \rightarrow \text{CaOCl}_2 + \text{H}_2\text{O}$

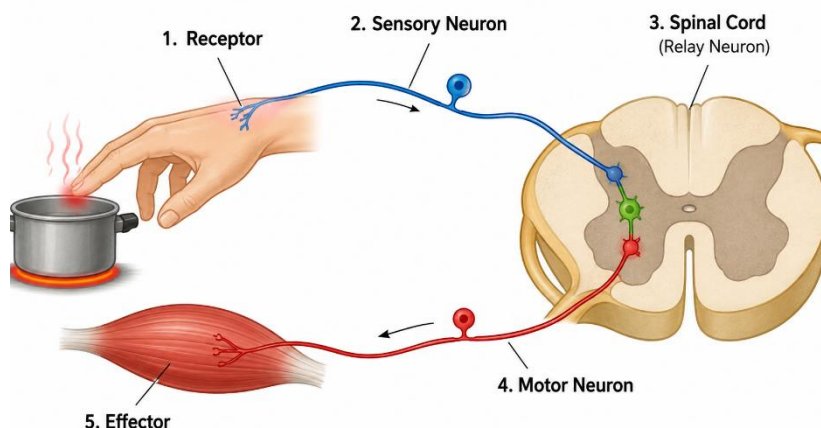
(c) Write two uses of bleaching powder.

Answer: Use 1: Bleaching powder is used for bleaching cotton and linen fabrics in the textile industry, as well as for bleaching wood pulp in paper factories.

Use 2: Bleaching powder is used for disinfecting drinking water, to make it free from germs and safe for consumption, and is also used as an oxidizing agent in various chemical industries.

Q43. Write the definition of Spinal Reflex (reflex action of the spinal cord). Draw a labeled diagram of it.

Answer: Definition: A spinal reflex (or reflex action) is an automatic, rapid, and involuntary response of the body to a particular stimulus, which is controlled by the spinal cord rather than the brain. In a spinal reflex, the nerve impulse travels from the receptor, through a sensory neuron, to the spinal cord, where it is processed by a relay neuron (interneuron), and then a response signal is sent out through a motor neuron directly to the effector (muscle or gland), without needing to first travel all the way to the brain for conscious processing. This entire pathway of a reflex action is called a **reflex arc**, and this rapid, involuntary mechanism allows the body to respond very quickly to potentially harmful stimuli (such as touching a hot object), protecting it from injury.



OR

What is photosynthesis? Explain the raw materials needed for it, and how plants obtain these materials.

Answer: Definition: Photosynthesis is the biochemical process by which green plants (and some other organisms like algae and certain bacteria) synthesize their own food (glucose) using carbon dioxide and water, in the presence of sunlight and chlorophyll (the green pigment found in chloroplasts). Oxygen is released as a byproduct of this process.

The overall chemical equation for photosynthesis is: $6CO_2 + 6H_2O \xrightarrow{\text{sunlight, chlorophyll}} C_6H_{12}O_6 + 6O_2$

Raw materials required for photosynthesis and how plants obtain them:

1. Carbon Dioxide (CO_2): Plants obtain carbon dioxide from the surrounding atmosphere. It enters the leaves through tiny pores called stomata, which are present mainly on the underside of leaves and can open or close to regulate gas exchange.

2. Water (H_2O): Plants absorb water from the soil through their roots, specifically through fine root hairs that increase the surface area for absorption. This water is then transported upward through the plant to the leaves via a specialized vascular tissue called xylem.

3. Sunlight: Plants obtain sunlight (solar energy) directly from the sun. This light energy is captured by the green pigment chlorophyll, present within the chloroplasts of leaf cells, which converts the light energy into chemical energy used to drive the photosynthesis reaction.

4. Chlorophyll: Chlorophyll is the green pigment present within the chloroplasts of plant cells (mainly in the leaves), which is not consumed in the reaction but acts as the essential catalyst/light-absorbing molecule that makes the entire process of photosynthesis possible by capturing light energy.

Together, using these four essential raw materials carbon dioxide, water, sunlight, and chlorophyll plants are able to synthesize glucose (their food) and release oxygen as a byproduct, which is essential not only for the plant's own survival and growth but also for sustaining most life on Earth that depends on oxygen for respiration.





Thank you!



We hope you found this material helpful. We wish you the very best for your examination.



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