Telangana Board Grade 10 Science 2015

Physical Science

Part-A

Section-I

$4 \times 4 = 16$

Q1. An object is placed at the following distances from a convex lens of focal length 10 cm.

(a) 8 cm
(b) 15 cm
(c) 20 cm
(d) 25 cm

Which position of the object will produce -
(i) a diminished, real and inverted image?
(ii) a magnified, real and inverted image?
(iii) a magnified, virtual and erect image?
(iv) an image of the same size as the object?

Justify your answer in each case.

Solution:

Given: Focal length of convex lens (f) = 10 cm

A convex lens forms different types of images based on the object's position.

(i) Diminished, Real, and Inverted Image:

This occurs when the object is placed beyond 2F (more than 20 cm).

Since 25 cm is beyond 2F = 20 cm, the image formed will be diminished, real, and inverted.

(ii) Magnified, Real, and Inverted Image:

A convex lens produces a magnified, real, and inverted image when the object is placed between F (10 cm) and 2F (20 cm).

Since 15 cm lies in this range, the image will be magnified, real, and inverted.

(iii) Magnified, Virtual, and Erect Image:

When the object is placed within the focal length (less than 10 cm), the lens forms a magnified, virtual, and erect image.

Since 8 cm is less than F = 10 cm, the image will be magnified, virtual, and erect.

(iv) Image of the Same Size as the Object:

When the object is placed at 2F (twice the focal length, i.e., 20 cm), the image is real, inverted, and of the same size.

Since 20 cm = 2F, the image size remains the same.

Correct position: 20 cm.

OR

How do you verify that resistance of a conductor of uniform cross-section area is proportional to the length of the conductor at a constant temperature?

Solution:

1. Take two copper wires of different lengths (L and L') but with the same cross-sectional area (A).
2. Connect the wires to a circuit and measure their resistances (R and R') using a voltmeter and ammeter.
3. The resistance of a conductor is given by the formula:

$$R = pL/A$$

where ρ is the resistivity of the material.

Since resistivity (ρ) and cross-sectional area (A) remain constant, the formula simplifies to:

$R \propto L$

Similarly, for the second wire of length L', the resistance is: $R' = \rho L'/A$

Taking the ratio of both equations: $R/R' = L/L'$. This equation shows that the resistance is directly proportional to the length of the conductor.

This confirms that as the length of the conductor increases, its resistance also increases proportionally, verifying that $R \propto L$.

Q2. Explain the process of melting and latent heat of fusion.

Solution:

Melting is the process in which a solid changes into a liquid when heated. When heat is supplied to a solid, its particles gain energy and vibrate faster. As the temperature increases, the particles overcome the strong forces holding them together. At a specific temperature, known as the melting point, the solid turns into a liquid. For example, ice melts into water at 0°C. During this process, the temperature remains constant until the entire solid has melted.

The latent heat of fusion is the amount of heat energy required to convert 1 kg of a solid into a liquid at its melting point without changing its temperature. This energy is used to break the intermolecular bonds in the solid, allowing it to become a liquid. Since the heat energy is utilized in breaking these bonds, there is no rise in temperature during the phase transition. For water, the latent heat of fusion is 334 kJ/kg, meaning this much energy is needed to convert 1 kg of ice into water at 0°C.

OR

(a) State the Right-hand rule with a labelled diagram.

(b) A coil of insulated copper wire is connected to a Galvanometer. What happens, if a bar magnet is

(i) pushed into the coil?

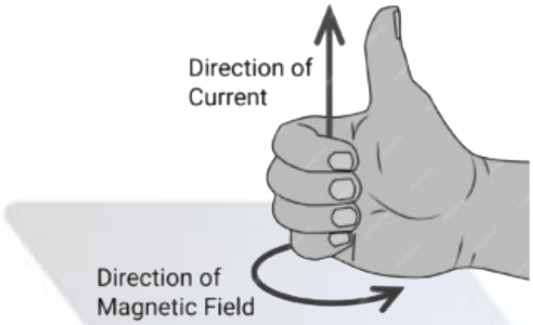
(ii) withdrawn from inside the coil?

(iii) held stationary inside the coil?

Solution:

(a) Right-Hand Rule:

The Right-Hand Thumb Rule, given by Maxwell, helps determine the direction of the magnetic field around a current-carrying conductor. According to this rule, if you hold a straight conductor with your right hand so that the thumb points in the direction of current flow, then the curled fingers show the direction of the magnetic field around the conductor.



(b) Effect of a bar magnet on a coil connected to a Galvanometer:

(i) When the magnet is pushed into the coil – The Galvanometer needle deflects, indicating that a current is induced due to the changing magnetic field inside the coil.

(ii) When the magnet is withdrawn from the coil – The Galvanometer needle deflects in the opposite direction, showing that the direction of the induced current is reversed.

(iii) When the magnet is held stationary inside the coil – No deflection is observed in the Galvanometer, as there is no change in the magnetic field, and hence no induced current is generated.

Q3. (a) Equal lengths of Magnesium ribbons are taken in two test-tubes *X* and *Y*. Hydrochloric acid is added to test-tube *X* and Acetic acid is added to test-tube *Y*. In which test-tube, the reaction will be more vigorous? Why?

(b) Name the four chemicals that are obtained from common salt and write their molecular formula.

Solution:

(a) The reaction in test tube X is more vigorous because HCl is a strong acid, which completely ionizes in solution, producing a high concentration of H^+ ions. This leads to a faster reaction with magnesium, releasing hydrogen gas (H_2) more rapidly. In contrast, acetic acid is a weak acid and only partially ionizes, resulting in a slower reaction.

(b) The four important chemicals obtained from common salt (NaCl) and their molecular formulas are:

1. Bleaching Powder (Calcium Oxychloride) – $CaOCl_2$
2. Ammonium Chloride – NH_4Cl
3. Sodium Hydroxide – NaOH
4. Sodium Carbonate – Na_2CO_3

OR

(a) $N_2(g) + O_2(g) + Heat \rightarrow 2NO(g)$

What information do you get from the above equation? Comment.

(b) Write an activity about how you conduct an experiment to show that more reactive metals replace less reactive metals from their compounds.

Solution:

(a) The reaction $N_2(g) + O_2(g) + Heat \rightarrow 2NO(g)$ shows that one mole of nitrogen gas (N_2) reacts with one mole of oxygen gas (O_2) in the presence of heat to produce two moles of nitrogen monoxide (NO). This process indicates that energy is required to break the strong triple bond in nitrogen, making the reaction endothermic.

(b) To show that a more reactive metal can replace a less reactive metal from its compound, we can perform the following experiment: Take a beaker with copper(II) sulphate ($CuSO_4$) solution, which has a blue color. Place an iron nail in the solution and leave it undisturbed for some time.

We will observe that the blue solution gradually turns green, indicating the formation of iron(II) sulphate ($FeSO_4$) as iron displaces copper from the solution.

The reaction is:

$Fe + CuSO_4 \rightarrow FeSO_4 + Cu$

Q4. Two elements *X* and *Y* belong to Groups 1 and 2, respectively, in the same period of the Periodic Table. Compare these elements to:

(i) some electrons in their outermost orbit.

(ii) their atomic size and their valencies.

(iii) their ionization energy and metallic character.

(iv) formulae of their chlorides and sulphates.

Solution:

(i) Two elements, X (Group 1) and Y (Group 2), belong to the same period in the Periodic Table. They can be compared as follows:

Electron Configuration: Element X has 1 electron in its outermost shell, while Y has 2 electrons in its outer shell.

(ii) Atomic Size and Valency: X has a larger atomic size than Y because atomic radius decreases across a period. The valency of X is 1, and Y has a valency of 2.

(iii) Ionization Energy and Metallic Character: X has lower ionization energy than Y, meaning it loses electrons more easily. However, X is more metallic as metallic character decreases across a period.

(iv) The formulae for Chlorides: XCl and YCl_2 and Sulphates: X_2SO_4 and YSO_4.

OR

The four metals A, B, C and D, are in turn added to the following solutions one by one. The observations made are tabulated below:

Metal	Iron(II) Sulphate	Copper(II) Sulphate	Zinc Sulphate	Silver Nitrate
A	No reaction	Displacement	-	
B	Displacement		No reaction	
C	No reaction	No reaction	No reaction	Displacement
D	No reaction	No reaction	No reaction	No reaction

Answer the following based on the above information:

(i) Which is the most reactive metal? Why?

(ii) What would be observed. If "B" is added to a solution of Copper (II) Sulphate and why?

(iii) Arrange the metals, A, B, C, D in the order of increasing reactivity.

(iv) Which one among A, B, C and D metals can be used to make containers that can be used to store any of the above solutions safely?

Solution:

(i) Metal B is the most reactive because it displaces iron from iron sulfate, which shows a higher reactivity than A, C, and D.

(ii) If metal B is added to a solution of copper(II) sulfate ($CuSO_4$), it displaces copper, causing the blue color of the solution to fade as copper metal is deposited. The reaction is:

$B + CuSO_4 \rightarrow BSO_4 + Cu$

(iii) $D < C < A < B$ is the metals in the increasing order of reactivity

(iv) Metal D is the least reactive and does not react with any of the solutions. Therefore, containers made of metal D can be safely used for storing any of the given solutions without undergoing corrosion or reaction.

Section-II

$6 \times 2 = 12$

Q5. Suggest the reasons for the phenomenon associated with the following:

(i) the sky appearing blue

(ii) the twinkling stars

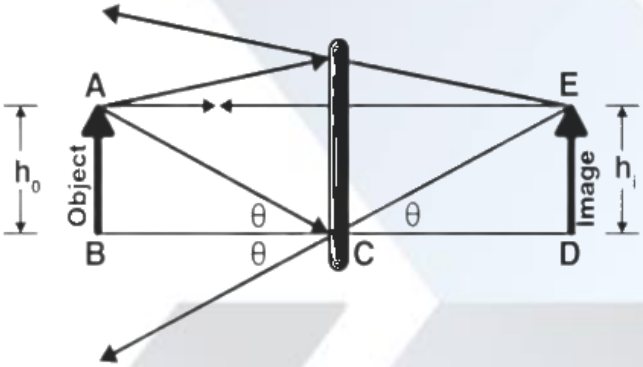
Solution:

(i) When sunlight passes through the Earth's atmosphere, it interacts with air molecules and tiny particles. Among all the colors in sunlight, blue light has a shorter wavelength and gets scattered in different directions more than other colors. As a result, our eyes receive more blue light, making the sky appear blue. During sunrise and sunset, sunlight has to travel a longer distance through the atmosphere. Most of the blue light gets scattered away, allowing red and orange colors to dominate, giving the sky a reddish appearance.

(ii) Stars appear to twinkle because their light passes through multiple layers of Earth's atmosphere, which have varying temperatures and densities. This causes the light to bend (refract) in different directions, making the star's position appear to shift slightly. Since this bending is not uniform, the brightness of the star fluctuates, creating the twinkling effect.

Q6. Draw the diagram that explains the formation of an image by a plane mirror.

Answer:



Q7. A ray of light enters from air to a medium *X*. The speed of light in the medium is $1.5 \times 10°\text{m/s}$ and the speed of light in air is 3×10^8 m/s. Find the refractive index of the medium X.

Solution:

Given:

- Speed of light in air c = 3×10^8 m/s
- Speed of light in medium v = 1.5×10^8 m/s

X = c/v, where c is the speed of light in air, while v is the speed of light in medium X. Hence, Refractive index of X = $(3 \times 10^8)/(1.5 \times 10^8) = 2$.

Q8. For a better understanding of the electronic configuration in an atom, the teacher wrote a shorthand notation nl^x on the blackboard. Looking at the notation, what could be the probable questions that generate in the student's mind? Write any two of them.

Solution:

Looking at the notation nl^x, the probable questions that generate in the student's mind are given below:

(i) What does n represent in the notation?

(ii) How does this notation describe the electronic configuration of an atom?

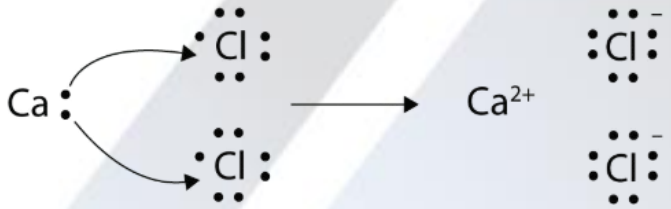
Q9. Represent the following molecules using Lewis notation:

a. Calcium and Chlorine to form Calcium chloride

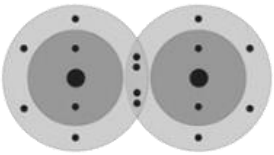
b. Formation of Oxygen molecule from Oxygen atoms

Solution:

(a) Calcium (Ca) donates two electrons to two chlorine (Cl) atoms, forming Ca^{2+} and two Cl^- ions. The resulting ionic bond creates calcium chloride ($CaCl_2$).



(b) Each oxygen atom (O) has six valence electrons. They share two pairs of electrons, forming a double bond and a stable O_2 molecule.



Oxygen Molecule (O_2)

Q10. (a) Why are vegetable oils healthy as compared to vegetable ghee?
(b) $CH_3 - CH(Cl) - CH = CH_2$ has the IUPAC name _____.

Solution:

Q11. (a) Vegetable oils are unsaturated fats, which can be easily broken down in the body and are considered healthier. In contrast, vegetable ghee contains saturated fats, which are more difficult to metabolize and can lead to health issues like heart disease.

(b) The given structure represents 2-chlorobut-3-ene because the longest chain contains four carbon atoms (butane as the base name). A double bond is present at carbon 3 (-ene suffix). The chlorine (Cl) atom is attached to carbon 2, hence 2-chlorobut-3-ene.

Section-III

$7 \times 1 = 7$

Q12. What is the cause of Presbyopia?

Solution:

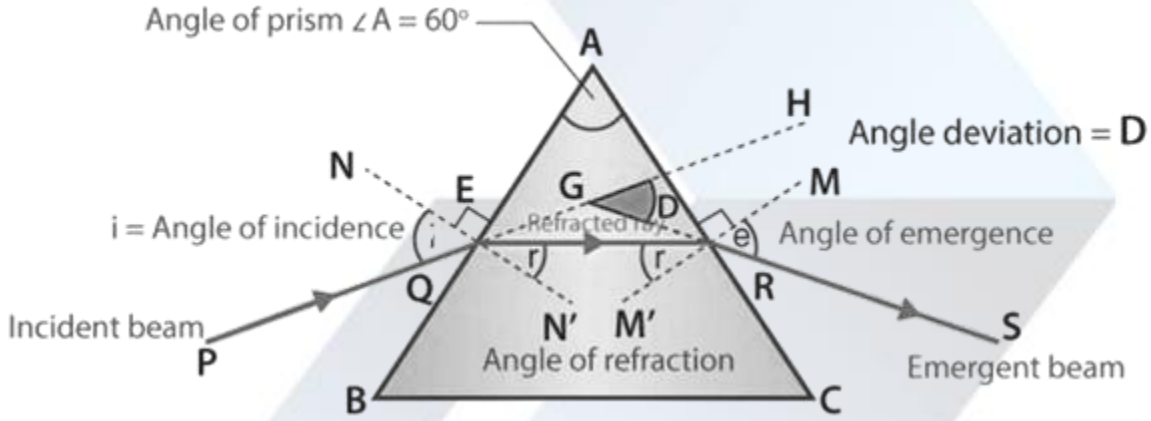
Presbyopia is often mistaken for hyperopia because both cause difficulty in seeing nearby objects. It occurs naturally as a person ages, typically between 40 to 60 years. The ciliary muscles weaken, and the crystalline lens loses its flexibility,

making it harder to focus on close objects. Even individuals who have never had vision issues may develop presbyopia over time.

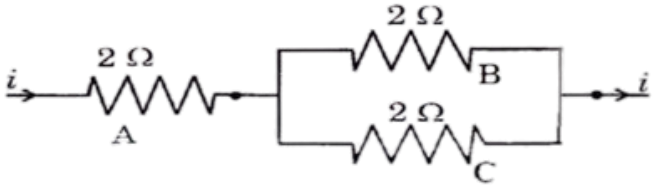
Q13. Draw a ray diagram to show the angle of deviation when a ray of light passes through a glass prism.

Solution:

When a ray of light passes through a glass prism, the angles formed are shown here:



Q14. Three resistors A, B and C are connected as shown in the figure. Each of them dissipates energy to a maximum of 18 W. Find the maximum current that can flow through the three resistors.



Solution:

Power dissipated by each resistor, P = 18 W

Resistance of each resistor, R = 2 Ω

Using the formula $P = I^2R$, we calculate:

$I^2=P/R$

$=18/2=9$

$I=\sqrt{9}=3A$

Thus, the maximum current flowing through resistor A is 3 A. Since resistors B and C are in parallel, the current divides equally between them:

$I_B=I_C=3/2=1.5A$

So, the maximum current flowing through B and C is 1.5 A each.

Q15. What happens when a current carrying wire is placed in a magnetic field?

Solution:

A current-carrying wire placed in a magnetic field experiences a force. The direction of this force is determined using Fleming's Left-Hand Rule. If the thumb, forefinger, and middle finger of the left hand are held perpendicular to each other:

- The forefinger represents the magnetic field.
- The middle finger represents the current.
- The thumb shows the direction of force (motion) on the wire.

Q16. On adding dilute hydrochloric acid to copper oxide powder, the solution formed is blue-green. Write the new compound formed.

Solution:

When dilute hydrochloric acid is added to copper oxide, a chemical reaction occurs, forming copper(II) chloride and water.

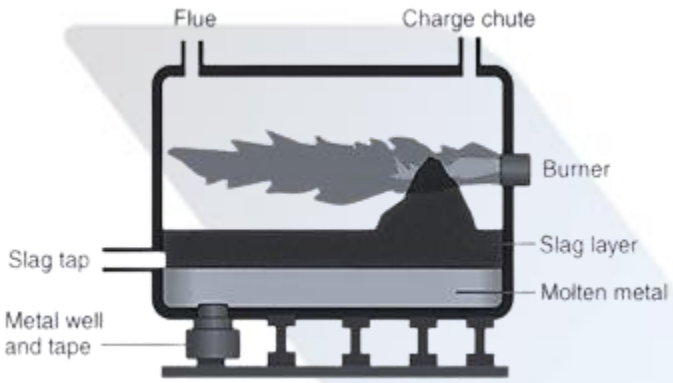
The reaction is:

$CuO+2HCl\rightarrow CuCl_2+H_2O$

The blue-green color is due to the formation of copper(II) chloride ($CuCl_2$).

Q17. Draw a neat labelled diagram of a Reverberatory furnace.

Solution:



Q18. How do you explain the role of Oxygen in the combustion process?

Solution:

Oxygen is essential for combustion, acting as an oxidizing agent that helps fuels burn. When a fuel combines with oxygen, it undergoes a chemical reaction, releasing heat and light. Without oxygen, combustion cannot take place.

Section-IV

$10 \times 1/2 = 5$

Q19. The temperature (T) of two samples of the same substance with masses m_1 and m_2 and temperatures T_1 and T_2, when added together is

(a) $(m_2T_1) - (m_1T_2)/(m_1 - m_2)$

(b) $(m_1T_1) + (m_2T_2)/(m_1 + m_2)$

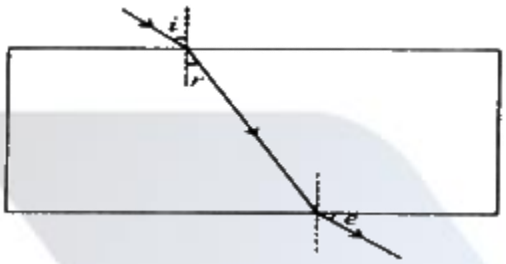
(c) $m_1\mathrm{T}_1 + m_2\mathrm{T}_2$

(d) $m_1\mathrm{T}_2 + \mathrm{m}_2\mathrm{T}_1$

Solution:

(b) $(m_1T_1) + (m_2T_2)/(m_1 + m_2)$

Q20. In the diagram the correctly marked angles are



(a) $\angle i$ and $\angle r$

(b) $\angle r$ and $\angle e$

(c) $\angle i$ and $\angle e$

(d) $\angle$i, $\angle$r and $\angle$e

Solution:

(c) $\angle$i and $\angle$e

Q21. A teacher held a pencil close to a spherical mirror and asked four students W, X, Y and Z to predict the nature of the mirror with the help of the image formed in the mirror. The image was erect and enlarged. The four students identified it as follows

W-Convex in nature

X-Concave in nature

Y -Plane mirror

Z -Plano-concave mirror

The correct statement was given by

(a) W

(b) X

(c) *Y*

(d) Z

Solution:

(b) X

Q22. The far point of a myopia eye is 1.5 m. To correct this defect of the eye, the power of the lens is ___.

(a) 0.66 D

(b) -0.66D

(c) +1.5 D

(d) -1.5D

Solution:

(b) -0.66D

Q23. A device for producing electric current is

(a) Ammeter

(b) Voltmeter

(c) Generator

(d) Galvanometer

Solution:

(c) Generator

Q24. When Ethanoic acid is added to a solution of substance *X*, a colourless and odourless gas *Y* is liberated. The gas *Y* turns lime-water milky. The substance *X* is

(a) $NaHCO_3$

(b) NaOH

(c) CH_3COONa

(d) NaCl

Solution:

(a) $NaHCO_3$

Q25. Soaps do not create water pollution because

(a) Soaps are insoluble in water

(b) Soaps are soluble in water

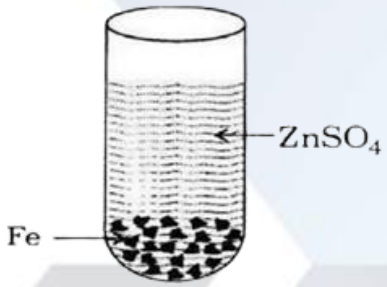
(c) Soaps are 100% biodegradable

(d) Soaps are non-biodegradable

Solution:

(c) Soaps are 100% biodegradable

Q26. The correct observation made by the student after putting clean pieces of Iron in the test tube containing Zinc sulphate is as shown in the figure.



(a) The solution becomes colourless, and Zinc gets deposited on Iron.

(b) The solution becomes green, and Zinc gets deposited on Iron.

(c) Iron pieces get dissolved in the solution making it green.

(d) No reaction observed

Solution:

(d) No reaction observed

Q27. The maximum number of electrons that can be accommodated in all the orbitals for which $I = 3$ is

(a) 6

(b) 10

(c) 14

(d) 18

Solution:

(c) 14

Q28. Mendeleev's eka-aluminium is

(a) Scandium

(b) Galium

(c) Germanium

(d) Indium

Solution:

(b) Galium

Biological Science

Part A

Section I

$4 \times 4 = 16$

Q1. How can you say that Kidney is suitable for the filtration of biological waste from the blood in a man?

Solution:

The kidneys play a crucial role in filtering waste from the blood. Every day, they process a large volume of blood, removing harmful substances and excess fluids. The purified blood is sent back into circulation, while the waste materials are converted into urine and stored in the bladder until excretion. This function helps maintain the body's overall health by eliminating toxins.

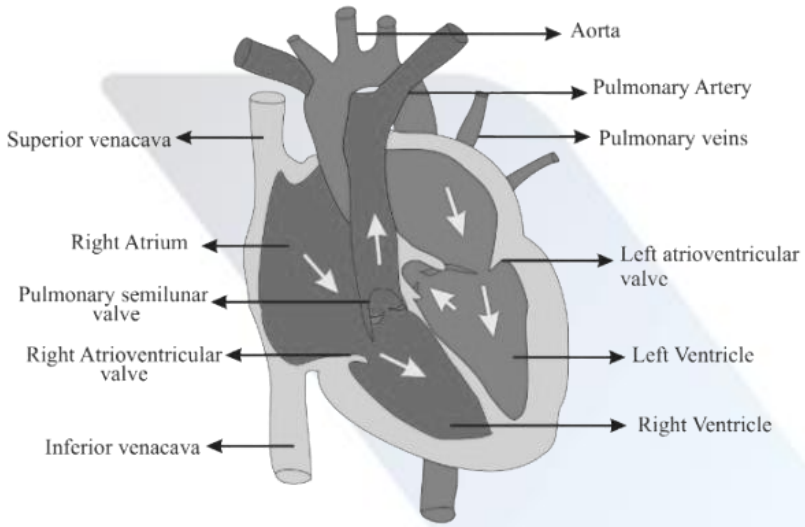
OR

What is called the pumping station in the human body? Explain its structure with a suitable diagram.

Solution:

The heart is known as the pumping station of the human body. It is a muscular organ that continuously pumps blood throughout the body, supplying oxygen

and nutrients to various organs. The heart has four chambers—two atria and two ventricles—that work together to circulate blood efficiently.



Q2. Write the differences between:
(i) Mitosis- Meiosis
(ii) Photosynthesis- Respiration

Solution:

(i) Mitosis vs. Meiosis

- Mitosis produces two identical daughter cells, while meiosis results in four genetically different cells.
- Mitosis occurs in body cells for growth and repair, whereas meiosis happens in reproductive cells to produce gametes.

(ii) Photosynthesis vs. Respiration

- Photosynthesis converts sunlight into energy and produces oxygen, whereas respiration breaks down food to release energy.
- Photosynthesis occurs in plants, while respiration occurs in both plants and animals.

OR

Explain the changes involved in the formation of seed from Ovule.

Solution:

A seed develops when a fertilized ovule undergoes cell division. Fertilization occurs when a male gamete from pollen fuses with a female gamete in the ovule, forming a zygote. The zygote then grows into an embryo, while the ovule transforms into a seed. As the process continues, the ovary of the flower develops into a fruit, while other flower parts wither away. This marks the completion of reproduction in plants, ensuring the growth of new plants under suitable conditions.

Q3. What materials are required to prove that Oxygen is produced during Photosynthesis in the presence of light? What procedure do we need to follow to perform the above experiment?

Solution:

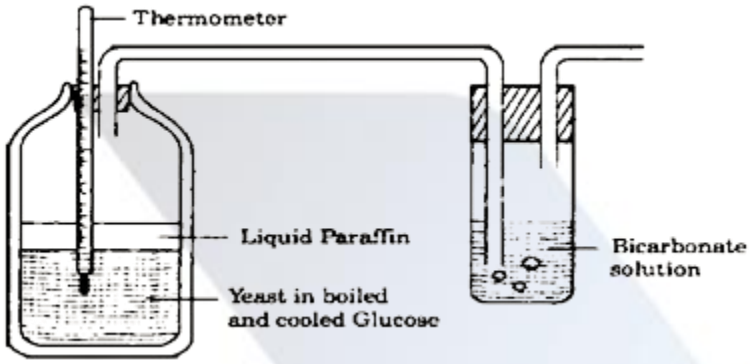
To demonstrate that oxygen is released during photosynthesis, we need the following materials:

- A test tube
- A beaker
- Water
- A funnel
- A water plant like Hydrilla

Procedure:

1. Place the Hydrilla plant inside a beaker filled with water.
2. Invert a water-filled test tube over the narrow end of a funnel and submerge it in the beaker.
3. Ensure that the water level in the beaker is higher than the funnel opening.
4. Place one setup in sunlight and another in the dark.
5. After a few hours, observe tiny bubbles collecting in the test tube in the setup exposed to sunlight.
6. Test the gas by bringing a glowing matchstick near it. If the matchstick reignites, it confirms the presence of oxygen.

OR



Observe the following diagrams and answer the following questions:

1. What does the above setting(diagram) indicate?
2. Why is boiled and cooled Glucose covered with Paraffin?
3. What is the use of adding diazine green to Glucose solution? What change do you notice in Glucose solution?
4. Why is lime water used in this experiment?
5. Why is the bulb of a thermometer dipped in the Glucose water?

Solution:

(1) The setup is designed to demonstrate anaerobic respiration in yeast. This experiment helps to show how yeast respires and produces carbon dioxide in the absence of oxygen.

(2) Paraffin is added to prevent oxygen from entering the glucose solution, ensuring that only anaerobic respiration takes place. This allows us to observe the process and confirm the release of carbon dioxide without the influence of oxygen.

(3) Diazine green is used to remove oxygen from the glucose solution. When oxygen is absent, the solution changes to a pink color, indicating anaerobic conditions necessary for the experiment.

(4) Lime water is used to detect the presence of carbon dioxide. When carbon dioxide is released, it turns lime water milky, confirming that anaerobic respiration is occurring.

(5) The thermometer is used to measure the temperature of the glucose solution. It ensures that the experiment is conducted under controlled conditions, as temperature affects the rate of respiration.

Q4. Read the following table and answer the questions given below:

Sl. No.	Name of the Gland	Location	Hormone Secreted	Response of the body to hormone
1	Pituitary	Floor of brain	Somatotropin Gonadotropin	Growth of bone Activity of ovary and testis
2	Thyroid	Neck	Thyroxine	General growth rate and metabolic activity
3	Ovary	Lower abdomen	Estrogen	Growth of the uterus and skeleton of the pelvis
4	Testis	Scrotal Sac	Testosterone	Growth of male secondary sexual characters

1. Write the importance of glands and hormones
2. Which hormone is responsible for growth of bone?
3. What happens when testosterone is not secreted?
4. Where is the gland that secreted thyroxine located?
5. Which glands are common in male and female?

Solution:

(1) Glands are essential parts of the endocrine system that produce and release hormones. These hormones regulate various body functions such as growth,

metabolism, and reproduction.

(2) The pituitary gland secretes somatotropin (growth hormone), which is responsible for bone growth and overall body development.

(3) If testosterone is not secreted, male secondary sexual characteristics such as facial hair growth, deep voice, and muscle development will not properly develop.

(4) The thyroid gland, which secretes thyroxine, is located in the neck. This hormone regulates metabolism and overall growth.

(5) The pituitary gland and thyroid gland are common in both males and females, as they regulate essential body functions like growth and metabolism.

OR

Observe the above table and answer the following questions:

Village	Type of Farmer	Income Per Acre on Crops			
		Paddy	Cotton	Mirchi	Maize
		7,500	9,300	5,200	5000

A	Large	26,700	38,000	16,700	12,900
B	Small	7,200	8,750	4,900	5,100
	Large	32,900	42,000	18,400	13,700

1. Which crop is most suitable to cultivate for smaller farmers in both the villages?
2. If you are a large farmer, which crop would you select to cultivate?
3. Which is the lowest income crop?
4. Is there any relationship between production of crops and income? How?

Solution:

1. Cotton is the most profitable crop for small farmers in both villages, as it provides the highest income per acre.

2. As a large farmer, I would choose to cultivate cotton since it generates the highest income compared to other crops.

3. For small farmers, maize provides the lowest income in Village A, while mirchi yields the lowest income in Village B. For large farmers, maize remains the lowest-income crop in both villages.

4. Yes, there is a relationship between crop production and income. Farmers prefer cultivating crops that provide higher income, as this helps them maximize profits and sustain their livelihoods.

Section-II

$6 \times 2 = 12$

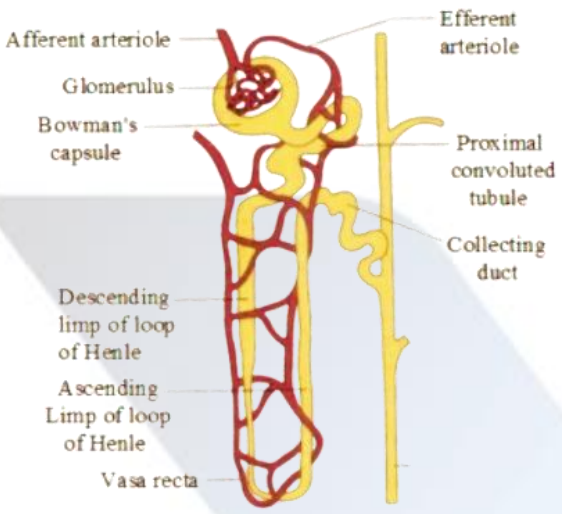
Q5. "Forest is a renewable resource". Do you agree? Justify.

Solution:

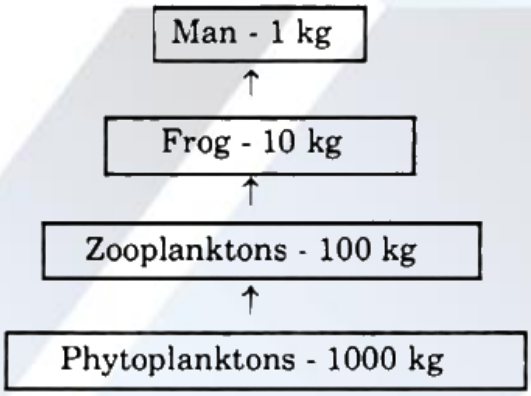
Forests can be both renewable and non-renewable resources. They are renewable when properly managed, as trees can grow back over time. However, if deforestation occurs at a faster rate than reforestation, forests become non-renewable. The increasing demand for land and excessive deforestation can lead to the loss of forests, making their recovery difficult over the long term.

Q6. Draw the structure of an excretory organ, which contains Bowman's Capsule and loop of Henle and label it.

Solution:



Q7. Explain the flow chart given below:



Solution:

An ecological pyramid is a graphical representation of the relationships among organisms at different trophic levels. The pyramid of energy is always upright because energy transfer in a food chain is unidirectional. With each successive trophic level, some energy is lost as heat and cannot be recycled back to the producers. This limits the number of levels in a food chain.

Q8. What questions do you pose to your teacher to understand "blood clotting"?

Solution:

To better understand blood clotting, I would ask the following questions:

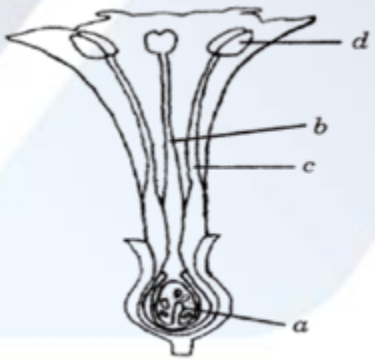
1. What is blood clotting, and why does it occur?
2. What triggers the process of blood coagulation?
3. What are the factors that influence clot formation?
4. What are the risks associated with abnormal blood clotting?
5. What are the medical treatments available for blood clotting disorders?

Q9. What happens if meiosis does not take place in the reproductive cell?

Solution:

If meiosis does not take place, reproductive cells will not undergo proper reduction in chromosome number. This would lead to gametes having an incorrect chromosome count, causing abnormalities in offspring. Without meiosis, fertilization would result in a doubling of chromosomes with each generation, leading to genetic imbalances and developmental issues.

Q10. Identify the flower parts a, b, c, d and write their main function.



Solution:

(a) Ovary – Contains ovules and is responsible for seed formation after fertilization.

(b) Style – A tube-like structure that connects the stigma to the ovary and allows pollen to travel to the ovules.

(c) Filament – A slender stalk that holds and supports the anther.

(d) Anther – Produces and stores pollen, which is essential for fertilization.

Section-III

Q11. To create awareness on "Water conservation" in your locality, what slogan will you suggest.

Solution:

Some effective slogans for raising awareness about water conservation include:

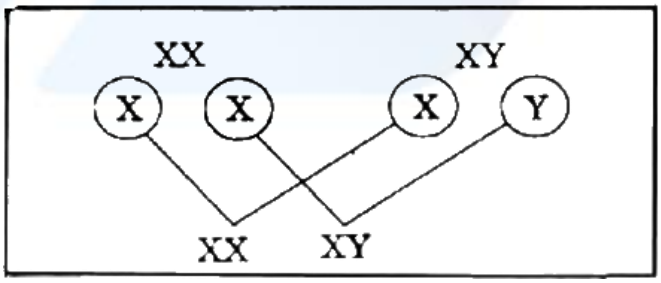
- "Water is life, save every drop!"
- "A thirsty world needs your help—conserve water today!"

Q12. Why is the stomach structured like a bag rather than like a tube?

Solution:

The stomach is structured like a bag to store food for a certain period, allowing digestive enzymes and gastric juices to mix thoroughly. This ensures proper digestion before the food moves to the intestines. If the stomach were tube-shaped, like the esophagus, food would pass too quickly into the intestines, preventing complete digestion.

Q13. Observe the following flow-chart and answer the following questions:



Who determines the sex of the baby- mother or father? How?

Solution:

The father determines the sex of the baby. Humans have two types of sex chromosomes:

- Males have XY chromosomes.
- Females have XX chromosomes.

During fertilization:

- If a sperm carrying an X chromosome fertilizes the egg (which always has an X chromosome), the resulting zygote will have an XX combination, leading to a female baby.
- If a sperm carrying a Y chromosome fertilizes the egg, the zygote will have an XY combination, resulting in a male baby.

Since the sperm carries either an X or Y chromosome, the father determines the baby's sex.

Q14. Why is KOH used in Moll's half- leaf experiment?

Solution:

Potassium hydroxide (KOH) is used in Moll's half-leaf experiment because it absorbs carbon dioxide from the environment. This helps to confirm that CO_2 is required for photosynthesis, as the part of the leaf exposed to KOH will not undergo photosynthesis due to the absence of carbon dioxide.

Q15. A plant, which grows near a window bends towards sunlight. Write a reason for it.

Solution:

Plants exhibit phototropism, a response to light. The hormone auxin accumulates on the shaded side of the stem, stimulating cell elongation in that region. This uneven growth causes the plant to bend toward the light source, helping it maximize photosynthesis.

Q16. Prepare your own tabular column to get information about food deficiency diseases from a doctor.

Solution:

Disease	Vitamin Deficiency	Symptoms
Rickets	Vitamin D	Weak bones, bowed legs
Scurvy	Vitamin C	Bleeding gums, weak immunity
Night Blindness	Vitamin A	Poor vision in low light
Beri-Beri	Vitamin B1	Weak muscles, nerve problems
Goitre	Iodine	Enlarged thyroid gland
Pellagra	Vitamin B3	Skin rash, diarrhea, dementia

Q17. What examples will you give to prove that Lamarckism is not correct?

Solution:

Lamarckism suggests that organisms acquire traits based on use or disuse and pass them to offspring. However, modern genetics disproves this theory. Some examples include:

- If an athlete builds strong muscles through training, their child will not inherit muscular strength.
- A person who loses an arm in an accident will not have children born without an arm.
- Despite the long-standing human need to fly, no humans have developed wings over generations.

These examples show that acquired characteristics are not inherited, contradicting Lamarck's theory.

Section-IV

Q18. Deficiency of folic acid causes

(a)Anaemia

(b)Pellagra

(c) Glossitis

(d) Rickets

Solution:

(a) Anaemia

Q19. Acid present in the gastric juice _____.

(a)Sulphuric acid

(b)Hydrochloric acid

(c) Nitrous acid

(d) Phosphoric acid

Solution:

(b) Hydrochloric acid

Q20. Identify the mismatched pair:

(a)Haustoria- Cuscuta

(b)Testosterone- Ovary

(c) Granum- Chloroplast

(d) Epiglottis-Mouth

Solution:

(b) Testosterone- Ovary

Q21. How do the sperm enter the egg-cell?

(a)Tears a hole in membrane

(b)Dissolves the membrane with chemicals

(c) Bites through the membrane with teeth

(d) Squeezes through gaps in the membrane

Solution:

(d) Squeezes through the gaps in the membrane

Q22. Identify the diagram

(a)Algae

(b)Neuron

(c) Blood cell

(d) Mitochondria

Solution:

(b) Neuron

Q23. Outer membrane of the lungs is called pleura. Name the outer membrane of heart.

(a) Hypercardium

(b) Pericardium

(c) Apicardium

(d) Upper Cardium

Solution:

(b) Pericardium

Q24. A person has lost control of emotions. Which part of the brain is responsible for it?

(a) Cerebrum

(b) Diencephalon

(c) Mid brain

(d)Cerebellum

Solution:

(a) Cerebrum

Q25. Identify the animal in which excretory organ is absent

(a) Bird

(b) Amoeba

(c) Sponge

(d) B and C

Solution:

(c) Sponge

Q26. Which of the following practices is suitable for a farmer with less water resource?

(i) Selective short-term crops

(ii) Cultivate commercial crops

(iii) Adapt drip irrigation system

(iv) Crop holiday

(a) (i), (ii)

(b) (i), (ii), (iii)

(c) (i), (iv)

(d) (iii), (iv)

Solution:

(b) (i), (ii), (iii)

Q27. Which plant hormone is responsible for the closing of Stomata?

(a)Abscisic Acid

(b)Auxin

(c) Cytokinin

(d) Ethylene

Solution:

(a) Abscisic Acid