Grade 10 Science Telangana 2024

Part - I : Physical Sciences

Parts A and B

Time: 1 hour 30 min. **Max. Marks: 40**

Instructions:

- Read the question paper and understand every question thoroughly and write answers in given 1 hr. 30 min. time.
- 3 very short answer questions are there in section-I. Each question carries 2 marks. Answer all the questions. Write answer to each question in 3 to 4 sentences.
- 3 short answer questions are there in section-II. Each question carries 4 marks. Answer all the questions. Write answer to each question in 5 to 6 sentences.
- 3 essay-type questions are there in section-III. Each question carries 6 marks. Answer any two questions. Write answer to each question in 8 to 10 sentences.

PART - A

Time: 1 hour 15 minutes **Marks: 30**

SECTION-I

3 x 2=6

Instructions:

(i) 3 very short answer questions are there in this section-I.

(ii) Answer all the questions. Each question carries 2 marks.

(iii) Write answer to each question in 3 to 4 sentences.

Q1. Write any two daily life uses of Baking soda.

Solution:

Two daily life uses of baking soda are as follows:

- **As a baking agent –** Baking soda is commonly used in baking as a leavening agent. It helps dough rise by releasing carbon dioxide when mixed with an acid.

- **As a cleaning agent –** Baking soda is used for cleaning surfaces, removing stains, and deodorizing refrigerators due to its mild abrasive and odor-neutralizing properties.

Q2. Write the required materials, chemicals for "esterification reaction" activity.

Solution:

Materials and chemicals required for **esterification** reaction activity:

1. Materials: Test tubes, test tube holder, beaker, water bath, dropper and measuring cylinder and water (for heating)

2. Chemicals: Ethanol (C_2H_5OH), glacial acetic acid (CH_3COOH), conc. sulphuric acid (H_2SO_4) (acts as a catalyst).

Q3. Guess and write, what changes may happen to the focal length and position of optic centre of a convex lens, if it is broken into two pieces.

Solution:

- The **focal length of each broken piece remains the same** as that of the original lens. This is because the focal length of a lens depends on its material (refractive index) and the curvature of its surfaces, which do not change when the lens is broken.
- The **optic center of each broken piece shifts**. The optic center is the geometric center of the lens, and when the lens is broken, the new pieces will have their own geometric centers, which will no longer coincide with the original optic center.

SECTION-II

Q4. Mention the four physical methods of concentration of the ore and explain any two of them.

Solution:

Four physical methods of concentration of the ore are:

(a) Gravity separation or hydraulic washing

(b) Magnetic separation

(c) Leaching

(d) Electrostatic separation

The two methods of concentration of the ore:

1) Gravity separation (Hydraulic washing):
   - This method is used for ores that have a high density difference compared to the gangue particles.
   - The ore is washed with water in a stream or over a sloping surface, allowing the denser ore particles to settle while the lighter impurities are washed away.
   - Example: It is used for concentrating heavy oxide ores like hematite (Fe_2O_3).
2) Froth flotation:
   - This method is used for sulphide ores.
   - The powdered ore is mixed with water and collectors (e.g., pine oil) in a tank. Compressed air is then passed through the mixture, forming a froth.
   - Sulphide ore particles attach to the froth and rise to the surface, while impurities remain in the water and settle at the bottom.
   - Example: It is used for concentrating copper pyrite ($CuFeS_2$) and zinc blende (ZnS).

Q5. Write any four applications of Faraday's "Electromagnetic induction", and explain any two of them.

Solution:

Applications of electromagnetic induction:

(a) Electrical transformers

(b) Electrical generators

(c) Induction Cooktops

(d) Induction motors

Explanation of two applications are:

1) Electric Generators:

- Electromagnetic induction is the working principle behind electric generators.
- When a coil rotates in a magnetic field, a changing magnetic flux induces an electromotive force (EMF), producing an electric current.
- Example: Used in hydroelectric and thermal power plants to generate electricity.

2) Transformers:

- Transformers use electromagnetic induction to step up or step down voltage levels in AC circuits.
- A changing current in the primary coil induces a voltage in the secondary coil through a magnetic field.
- Example: Used in power transmission to reduce energy loss during long-distance electricity supply.

Q6. Observe the information given in the table. Answer the questions given below.

Element	Electronic configuration
Be	$1s^2\ 2s^2$
Mg	$1s^2\ 2s^2\ 2p^6\ 3s^2$
P	$1s^2\ 2s^2\ 2p^6\ 3s^2\ 3p^3$
Ne	$1s^2\ 2s^2\ 2p^6$

(i) Which of the given are s-block elements?

(ii) Which of the given has least valency?

(iii) Which of the given is 15th Group element?

(iv) Which of the given are of same Period?

Solution:

(i) Be (Beryllium) and Mg (Magnesium) are s-block elements because their valence electrons are in the s-orbital ($2s^2$ for Be, $3s^2$ for Mg).

(ii) Ne (Neon) has the least valency because it is a noble gas with a completely filled outer shell ($2p^6$), making it chemically inert with a valency of 0.

(iii) P (Phosphorus) belongs to Group 15 (or V-A group) as its electronic configuration ($1s^2\ 2s^2\ 2p^6\ 3s^2\ 3p^3$) shows 5 valence electrons ($3s^2\ 3p^3$).

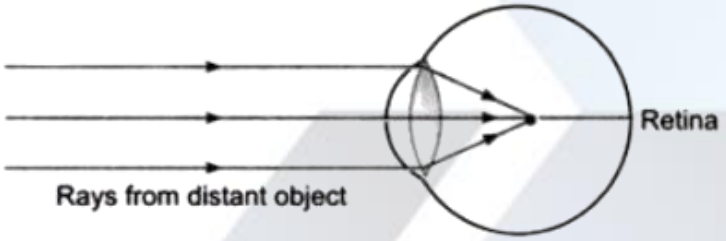
(iv) Mg (Magnesium) and P (Phosphorus) belong to Period 3, as they have electrons in the third shell (n=3).

SECTION-III

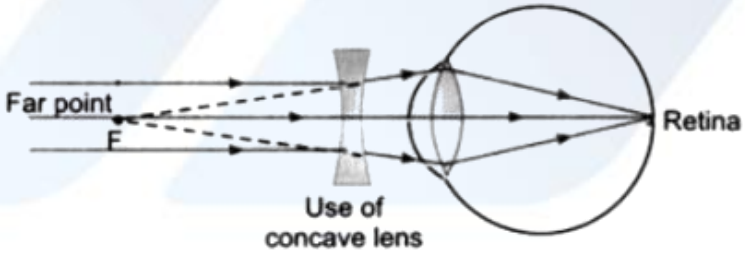
Q7. Draw the diagrams showing Myopia and its correction.

Solution:

Diagrams showing Myopia and its correction are shown below:



Myopic eye



Correction for myopia

Q8. Write the required material for the experiment to show that the ratio $\frac{V}{I}$ is a constant for a conductor. Explain the procedure of the experiment.

Solution:

Experiment – Ratio $\frac{V}{I}$ is a constant for a conductor

Materials required:

- A conductor (e.g., a nichrome wire)
- A battery or power supply
- Ammeter (to measure current, I)
- Voltmeter (to measure voltage, V)
- Rheostat (to vary the current)
- Connecting wires
- Switch

Procedure:

1. Connect the conductor (nichrome wire) in a circuit with a battery, ammeter, voltmeter (in parallel across the conductor), and a rheostat to control current.
2. Use the rheostat to vary the current passing through the conductor. For each adjustment, note the corresponding readings of voltage (V) from the voltmeter and current (I) from the ammeter.
3. Record multiple sets of V and I values in a table. Calculate $(\frac{V}{I})$ for each set.
4. If $(\frac{V}{I})$ remains constant for different values of current, it confirms that the ratio is a constant for the conductor, verifying Ohm's Law (V = IR).

Q9. Hydrogen reacts with Oxygen to produce water. What will be the mass of water produced if 100 grams of Hydrogen participated in the reaction? Calculate the number of molecules of water produced in this reaction.

[Atomic masses: H=1 u, O=16 u]

Solution:

Step 1: Write the balanced chemical equation

$$\mathbf{2H_2 + O_2 \rightarrow 2H_2O}$$

Step 2: Determine the molar mass of reactants and product

Molar mass of H_2 = 2 × 1 = 2g/mol

Molar mass of O_2 = 2 ×16 = 32g/mol

Molar mass of H_2O = 2 ×1 + 16 = 18g/mol

Step 3: Apply the Law of conservation of mass

From the balanced equation:

4g of H_2 reacts with 32g of O_2 to form 36g of H_2O

Mass ratio: 4g H_2 produces 36g H_2O

Step 4: Find the mass of water produced for 100g of H_2

Using the ratio:

$$\frac{36\text{g } H_2O}{4\text{g } H_2} = \frac{x}{100\text{g } H_2}$$

$$x = \frac{36 \times 100}{4} = 900\text{g } H_2O$$

Thus, **900 g of water** will be produced.

Step 5: Calculate the number of water molecules formed

- Moles of water produced:

$$\frac{\text{Mass of water}}{\text{Molar mass of water}} = \frac{900}{18} = 50 \text{ moles}$$

- Number of molecules of water:

$$50 \times 6.022 \times 10^{23} = 3.011 \times 10^{25} \text{ molecules}$$

Part - II : Biological Sciences

Parts A and B

Time: 1 hour 30 min. **Maximum Marks: 40**

Instructions:

- Read the Question Paper carefully and understand.
- Answer the questions under Part-A on the answer sheet provided.
- Part-A contains three sections - Section I, II and III.

- Part-B answers should be written in the given brackets and attach it to the Part-A answer sheet.

PART - A

SECTION – I

3x2=6

Instructions:

- This section contains 3 very short answer questions.
- Answer all the questions.

Q10. Write any two materials required to conduct an experiment to observe the internal structure of the mammalian heart.

Solution:

- Mammalian heart (e.g., sheep or goat heart)
- Dissection tools (scalpel, forceps, scissors, and dissecting tray)

Q11. Write any two biological principles to be followed by the farmers in your surroundings for controlling pests.

Solution:

- **Crop rotation:** Changing crops seasonally disrupts pest life cycles, reducing their population naturally.
- **Use of natural predators:** Introducing pest-eating organisms like ladybugs (for aphids) or frogs (for insects) helps control pests biologically.

Q12. What will happen if moisture and hairs are absent in the nasal cavity of human being?

Solution:

- **Absence of moisture:** Dry air would enter the respiratory tract, causing throat irritation and making breathing uncomfortable.
- **Absence of hairs:** Dust, microbes, and other airborne particles would enter the lungs directly, increasing the risk of respiratory infections and allergies.

SECTION – II 3x4=12

Instructions:

(i) This section contains 3 short answer questions.

(ii) Answer all the questions.

(iii) Write the answers in 5-6 sentences.

(iv) Each question carries 4 marks.

Q13. Write four differences between aerobic respiration and anaerobic respiration.

Solution:

Differences between aerobic and anaerobic respiration

Feature	**Aerobic Respiration**	**Anaerobic Respiration**
Oxygen Requirement	Occurs in presence of oxygen	Occurs in absence of oxygen
End Products	CO_2 and H_2O	Ethanol (in yeast) or Lactic acid (in muscles)
Energy Yield	Produces more ATP (36-38 ATP)	Produces less ATP (2 ATP)
Location in Cells	Occurs in mitochondria	Occurs in cytoplasm

Q14. Explain any two artificial propagation methods you observed in your daily life with examples.

Solution:

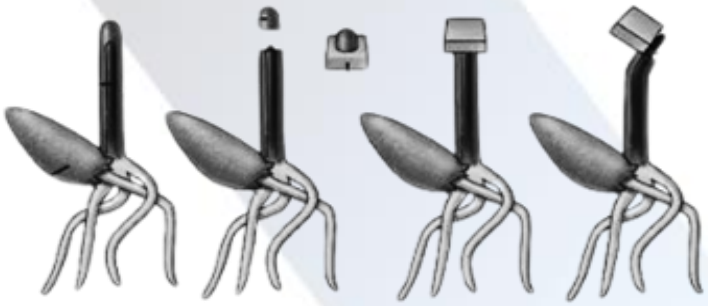
Two Artificial Propagation Methods are as follows:

1) **Cutting:**
   - A part of a plant, like a stem or leaf, is cut and planted in soil to grow into a new plant.
   - Example: Rose and Hibiscus can be grown from stem cuttings.

2) **Grafting:**

- A part of one plant (scion) is attached to another plant (stock) to combine desirable traits.
- Example: Mango and apple trees are commonly grown using grafting.

Q15. Observe the picture given below and answer the following questions.



(i) Name the scientist who conducted the experiment given in the above picture.

(ii) Which phytohormone was discovered by the above experiment?

(iii) Write the effect of the phytohormone identified in the above experiment on plants.

(iv) In the above experiment, name the material placed on the cut coleoptile tips of the oat seedling.

Solution:

(i) **F.W. Went** conducted the experiment given in the above picture.

(ii) The phytohormone **Auxin** was discovered by the above experiment.

(iii) Auxin promotes **cell elongation**, **root development**, and **phototropism** (bending towards light).

(iv) An **agar block containing auxin** was placed on the cut coleoptile tips of the oat seedling.

SECTION – III

2x6=12

Instructions:

(i) This section contains 3 essay type questions.

(ii) Answer any TWO questions.

Q16. Explain the evidences of Evolution with examples.

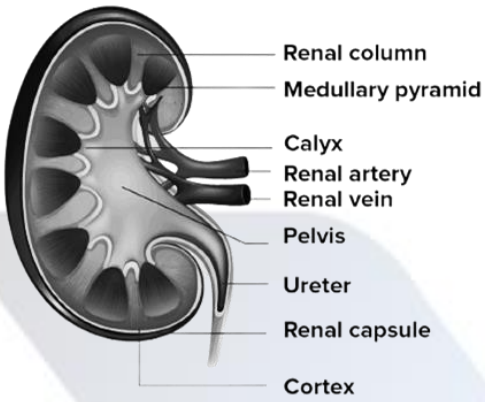
Solution:

The theory of evolution is supported by various types of evidence:

1) **Fossil Evidence:**
   - Fossils show transitional forms between species, proving gradual evolution.
   - Example: Archaeopteryx is a fossil that shows both reptilian and bird-like features, proving the link between reptiles and birds.
2) **Comparative Anatomy:**
   - Homologous structures (similar structure, different functions) indicate common ancestry.
   - Example: The forelimbs of humans, bats, and whales have similar bone structures but serve different functions (grasping, flying, and swimming).
3) **Embryological Evidence:**
   - Early embryos of different species look similar, showing a common ancestor.
   - Example: Human and fish embryos have gill slits during early development, suggesting an aquatic ancestry.
4) **Molecular Evidence:**
   - Similarities in DNA, proteins, and amino acid sequences among species indicate evolutionary relationships.
   - Example: Humans share about 98% of their DNA with chimpanzees, proving close evolutionary ties.

Q17. Draw a labelled diagram of internal structure of human kidney and explain the structure.

Solution:



Structure of kidney:

- **Cortex:** Outer layer containing nephrons (functional units of the kidney).
- **Medulla:** Inner region with renal pyramids where urine formation occurs.
- **Nephrons:** Microscopic structures that filter blood and produce urine.
- **Renal Pelvis:** Funnel-shaped cavity that collects urine and passes it to the ureter.
- **Ureter:** Tube that carries urine from the kidney to the bladder.

Q18. Explain the procedure and precautions of the experiment to prove Oxygen is evolved during Photosynthesis.

Solution:

Experiment – Oxygen is evolved during photosynthesis.

Procedure:

- Take a beaker with water and place a *Hydrilla* plant (aquatic plant) inside it.
- Cover the plant with an inverted funnel and place a test tube filled with water over the funnel's stem.
- Place the setup in sunlight for a few hours.
- Observe the gas bubbles accumulating in the test tube.
- Test the collected gas by introducing a glowing splinter—if it reignites or glows brightly, the gas is oxygen.

Precautions:

- Use fresh and healthy *Hydrilla* plants.

- Ensure the test tube is filled with water.
- Keep the setup in adequate sunlight for photosynthesis to occur.
- Handle glassware carefully to avoid breakage.