Grade 10 General Science Telangana 2024

GENERAL SCIENCE

Maximum Score: 40

Part – A and B

Instructions:

1. Read the Question paper carefully and understand.

2. Answer the questions under Part-A in the answer sheet provided.

3. Part-B questions should be answered in the given brackets in the Part-B itself and attach to the Part-A answer sheet.

4. Part-A contains three sections I,II and III.

5. Write the answers by following the instructions given in each section.

Part – A

Marks: 30

Section-I

3 × 2 = 6

Instructions:

(i) Six short answer questions are given in this Section.

(ii) Answer **any THREE** of the following questions.

(iii) Each question carries 2 marks.

(iv) Write the answers in 1 or 2 sentences.

Q1. Give two examples of the plants that are propagated by the cutting method.

Solution:

Rose and hibiscus are two examples of plants that can be propagated through stem cuttings.

Q2. What happens if the food we eat is not a balanced diet?

Solution:

Consuming an unbalanced diet can lead to malnutrition, causing deficiencies or excesses of certain nutrients. This may result in health issues such as weakened immunity, stunted growth, or obesity.

Q3. Write any two materials needed for an experiment to examine a mammal heart.

Solution:

A freshly collected specimen of a sheep or goat heart and a scalpel are two materials needed for an experiment to examine a mammal heart.

Q4. Write any two differences between photosynthesis and respiration.

Solution:

Photosynthesis	Respiration
Converts carbon dioxide and water into glucose and oxygen using sunlight.	Breaks down glucose and oxygen to produce carbon dioxide, water, and energy.
Stores energy in glucose molecules (anabolic process).	Releases energy from glucose molecules (catabolic process).

Q5. Write any two questions that you will ask your teacher about the Alkaloids.

Solution:

1. What are the medicinal uses of alkaloids found in plants?
2. How do alkaloids affect the nervous system in humans?

Q6. When cross is done between pure yellow and pure green pea seed-producing plants the following results were obtained (Y=yellow; y=green)

♀ / ♂	Y	y
Y	YY	Yy
y	yY	yy

Answer the questions given below based on the above table.

(i) Yy - indicates which colour of the seed?

(ii) What is the Phenotypic ratio of the above cross?

Solution:

(i) Yy represents a yellow seed because the yellow (Y) trait is dominant over the green (y) trait.

(ii) The phenotypic ratio of the above cross in the F_2 generation is 3:1 (three yellow seeds and one green seed).

Section-II

2 × 4 = 8

Instructions:

(i) Four short answer questions are given

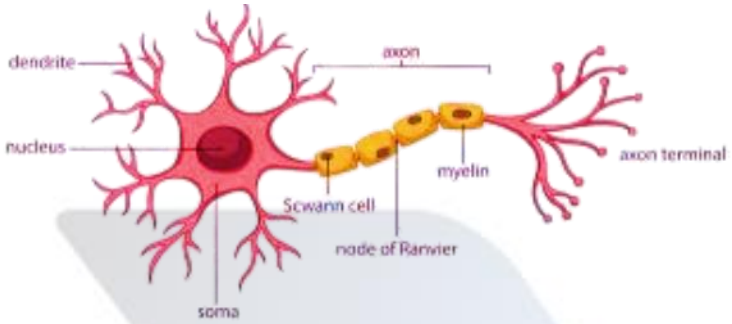
(il) Answer **any TWO** of the following

(ii) Each question carries Four marks.

(iv) Write the answers in 4 or 5 sentences.

Q7. Draw the diagram of nerve cell and label it.

Solution:



Q8. What happens if both kidneys fail completely in human beings?

Solution:

Complete failure of both kidneys leads to the accumulation of waste products and excess fluids in the body, resulting in a condition called uremia. This can cause symptoms such as nausea, fatigue, swelling, and confusion. Without medical intervention, such as dialysis or a kidney transplant, the condition can be life-threatening.

Q9. Explain the theory of "inheritance of acquired characters" with an example.

Solution:

The theory of "inheritance of acquired characters," proposed by Jean-Baptiste Lamarck, suggests that traits developed by an organism during its lifetime in response to environmental changes can be passed on to its offspring. For example, Lamarck theorised that giraffes originally had short necks but stretched them to reach higher leaves, and this acquired longer neck trait was inherited by subsequent generations. However, this theory has been largely discredited in favour of genetic inheritance principles established by Gregor Mendel.

Q10. Write any four slogans for propaganda against female foeticide.

Solution:

1. "Save the Girl Child, Secure the Future."
2. "Say No to Female Foeticide; Every Life Deserves a Chance."
3. "Girls Are Precious; Protect Them Before Birth."

4. "Stop Gender Discrimination; End Female Foeticide Now."

Section-III

4 × 8 = 16

Instructions:

(i) Four essay questions are given.

(ii) Answer **any TWO** of the following.

(iii) Each question carries 8 marks.

(iv) Write the answers in 8 to 12 sentences.

Q11. Write the procedure and observations of the experiment to prove that 'Oxygen is released during Photosynthesis.'

Solution:

Aim: To demonstrate that oxygen is released during photosynthesis.

Materials Required:

- A beaker
- A short-stemmed funnel
- A test tube
- Freshly collected Hydrilla (or any other aquatic submerged plant)
- Water
- A glowing incense stick

Procedure:

1. Place the *Hydrilla* plant inside the beaker filled with water.
2. Invert the funnel over the plant, ensuring the stem of the funnel is submerged.

3. Fill the test tube with water and carefully invert it over the stem of the funnel, ensuring no air bubbles are present.

4. Place the entire setup in sunlight for a few hours.

5. Observe the formation of gas bubbles from the Hydrilla plant, which collect at the top of the test tube, displacing the water.

6. Once a significant amount of gas has collected, carefully remove the test tube, keeping its mouth closed with your thumb to prevent the gas from escaping.

7. Introduce a glowing incense stick into the test tube.

Observations:

The glowing incense stick reignites, indicating the presence of oxygen.

Q12. Explain different steps in respiration in human beings

Solution:

Respiration in humans involves several steps to ensure the efficient exchange of gases and energy production:

Pulmonary Ventilation (Breathing):

Inhalation (Inspiration): Diaphragm contracts and moves downward, intercostal muscles contract, expanding the thoracic cavity, allowing air to enter the lungs.

Exhalation (Expiration**)**: Diaphragm relaxes and moves upward, intercostal muscles relax, reducing the thoracic cavity's volume, pushing air out of the lungs.

External Respiration (Gas Exchange in Lungs):

Oxygen from inhaled air diffuses across the alveolar membrane into the pulmonary capillaries, while carbon dioxide diffuses from the blood into the alveoli to be exhaled.

Transport of Gases:

Oxygen Transport: Oxygen binds to hemoglobin in red blood cells and is transported to tissues.

Carbon Dioxide Transport: Transported back to the lungs in three forms: dissolved in plasma, as bicarbonate ions, or bound to hemoglobin.

Internal Respiration (Gas Exchange in Tissues):

Oxygen diffuses from blood into tissue cells, while carbon dioxide produced by cells diffuses into the blood.

Cellular Respiration:

Glycolysis: Occurs in the cytoplasm; glucose is broken down into pyruvate, yielding 2 ATP molecules.

Krebs Cycle (Citric Acid Cycle): Takes place in the mitochondria; pyruvate is further broken down, producing electron carriers and releasing CO_2.

Electron Transport Chain (ETC): Electrons from carriers are transferred through membrane proteins, generating a large amount of ATP and forming water.

These steps ensure that oxygen is delivered to cells for energy production and carbon dioxide is removed as a waste product.

Q13. What is a cardiac cycle? Explain the steps involved in it.

Solution:

The cardiac cycle is the sequence of events occurring in the heart during one complete heartbeat. It includes the contraction (systole) and relaxation (diastole) of the atria and ventricles.

Three Phases of the Cardiac Cycle:

1. Atrial Systole (Contraction of Atria) – 0.1 sec

The atria contract, pushing blood into the ventricles.

The atrioventricular (AV) valves (tricuspid and mitral) open, allowing blood to flow into the ventricles.

The ventricles remain relaxed in this phase.

2. Ventricular Systole (Contraction of Ventricles) – 0.3 sec

The ventricles contract, forcing the AV valves to close (producing the "lub" sound).

The semilunar valves (aortic and pulmonary) open, allowing blood to flow into the aorta and pulmonary artery.

Meanwhile, the atria start relaxing and get filled with blood.

3. Diastole (Relaxation of Atria and Ventricles) – 0.4 sec

The ventricles relax, causing a drop in pressure.

The semilunar valves close (producing the "dub" sound) to prevent backflow of blood.

Blood from the venae cavae and pulmonary veins fills the atria, preparing for the next cycle.

The cardiac cycle lasts about 0.8 seconds and ensures continuous circulation of blood throughout the body.

Q14. Analyze the information given below. Write answers to the questions given below

Hormones	Uses
Auxins	Cell elongation, differentiation of shoots and roots
Cytokinins	Promote cell division, delaying the ageing in leaves, opening of stomata
Gibberelins	Germination of seeds, sprouting of truds, elongation of stem; stimulation of flowering; development of seedless fruits, breaking the dormancy in seeds and buds.
Abscisic acid	Closing of stomata; seed dormancy, promoting ageing of leaves.
Ethylene	Ripening of fruit.

(i) What are Phytohormones? Write the names of two phytohormones.

(ii) Which hormone is responsible for the closing of stomata and which hormone acts against it?

(iii) What are the functions performed by abscisic acid?

(iv) Which hormones help in the growth?

Solution:

(i) Phytohormones are plant hormones that regulate growth, development, and various physiological processes in plants. Two examples of phytohormones are Auxins and Cytokinins.

(ii) Abscisic acid (ABA) is responsible for the closing of stomata.

Cytokinins act against it by promoting the opening of stomata.

(iii) Functions of Abscisic Acid:

- Closes stomata to prevent water loss.
- Induces seed dormancy, preventing premature germination.
- Promotes ageing (senescence) of leaves.

(iv) The hormones that help in plant growth are:

- Auxins – Promote cell elongation and differentiation.
- Gibberellins – Stimulate stem elongation, seed germination, and flowering.

GENERAL SCIENCE (PHYSICAL SCIENCE)

Section-I

3 × 2 = 6

Instructions:

(i) Six short answer questions are given in this Section.

(ii) Answer **any THREE** of the following questions.

(iii) Each question carries 2 marks.

(iv) Write the answers in 1 or 2 sentences.

Q15. What would happen if ciliary muscles do not function properly?

Solution:

The eye lens will not change its shape to adjust focus. This will cause difficulty in viewing near or distant objects clearly, leading to blurred vision. It may result in presbyopia (difficulty in focusing on close objects) or other focusing disorders.

Q16. Write any two uses of a Convex mirror.

Solution:

- Used as rear-view mirrors in vehicles – Convex mirrors provide a wider field of view, helping drivers see more of the road.
- Used in security and surveillance – They are installed in stores, hallways, and ATMs to monitor blind spots.

Q17. Write the required material in the experiment 'acids react with metals'?

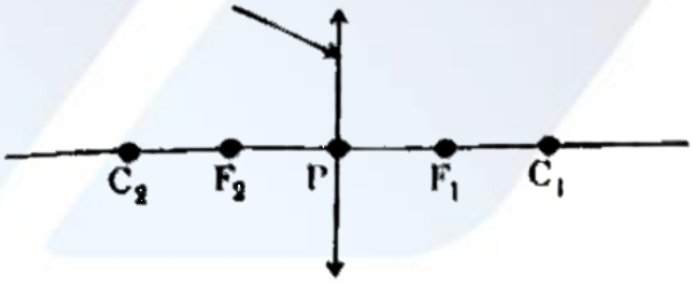
Solution:

The materials required for the experiment "Acids react with metals" are:

Dilute acid (such as hydrochloric acid (HCl) or sulfuric acid (H_2SO_4)).

Metal sample (such as zinc (Zn) or magnesium (Mg)).

Q18. Complete the following ray diagram.



Solution:

Q19. What would happen, if the metals like Copper and Iron do no get oxidized? Guess and write.

Solution:

If Copper and Iron do not get oxidised:

- Iron will not rust, making iron objects more durable and long-lasting.
- Copper will not form a greenish patina, preserving its original appearance.
- Corrosion-related damage to buildings, bridges, and tools would be prevented, increasing their lifespan.

Q20. Observe the table and answer the following questions.

S. No.	Name of the substance	pH value
1.	Distilled water	7
2.	Vinegar	4.5
3.	Sodium hydroxide	13.7

(i) Vinegar is added to distilled water. If methyl orange indicator is added to this solution, what will be the colour of the solution?

(ii) According to the given pH values, what is the nature of the substances?

Solution:

(i) Vinegar is acidic (pH = 4.5). When methyl orange is added to an acidic solution, it turns reddish-orange. Since vinegar is still acidic even after dilution with distilled water, the solution will appear orange to light red.

(ii) Distilled water (pH 7) is neutral.

Vinegar (pH 4.5) is acidic.

Sodium hydroxide (pH 13.7) is strongly basic (alkaline).

Section-II

2 × 4 = 8

Instructions:

(i) Four short answer questions are given

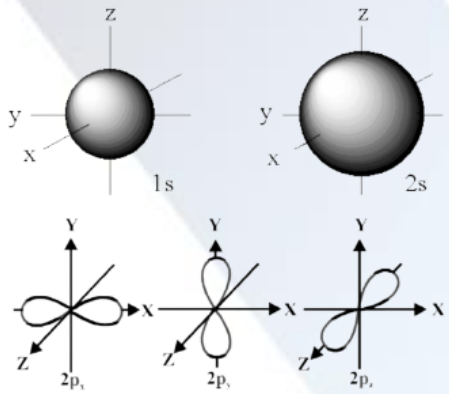
(ii) Answer **any TWO** of the following

(iii) (ii) Each question carries Four marks.

(iv) Write the answers in 4 or 5 sentences.

Q21. Draw the shapes of ' s ' and 'p' orbitals.

Solution:



Q22. Mention any four uses of lenses in day-to-day life.

Solution:

1. Spectacles – Lenses are used in glasses to correct vision problems such as myopia and hypermetropia.
2. Cameras – Convex lenses are used in camera lenses to focus light and capture clear images.
3. Magnifying Glasses – A convex lens helps enlarge objects for better visibility.
4. Microscopes and Telescopes – Lenses are used in scientific instruments to observe tiny objects and distant celestial bodies.

Q23. What would be the electronic configurations of Carbon and we do not follow Hund's rule? Guess and write.

Solution:

The atomic number of Carbon (C) is 6, and its normal electronic configuration follows Hund's rule as $1s^2\ 2s^2\ 2p^2$.
If Hund's rule is not followed, the electrons would pair up in the same orbital instead of occupying separate orbitals. The configuration would be:

$1s^2\ 2s^2\ 2p^6$, which is incorrect as Carbon has only 6 electrons. This would affect chemical bonding and stability.

Q24. Write the chemical equation of the reaction, when Hydrogen Oxygen and forms water. Balance the chemical equation.

Solution:

The chemical reaction for the formation of water is:

Unbalanced equation:

$$H_2 + O_2 \rightarrow H_2O$$

Balanced equation:

$$2H_2 + O_2 \rightarrow 2H_2O$$

Here, two molecules of hydrogen react with one molecule of oxygen to form two molecules of water.

Section-III

2 × 8 = 16

Instructions:

(i) Four essay questions are given.

(ii) Answer **any TWO** of the following.

(iii) Each question carries 8 marks.

(iv) Write the answers in 8 to 12 sentences.

Q25. Mention the required material in the experiment to verify Ohm : and write the experimental procedure.

Solution:

Required Materials:

- Battery or power supply
- Ammeter
- Voltmeter
- Resistor
- Rheostat (variable resistor)
- Connecting wires
- Switch

Experimental Procedure:

1. Set up the circuit by connecting a battery, a resistor, an ammeter in series, and a voltmeter in parallel across the resistor.
2. Turn on the circuit and note the readings of current (I) from the ammeter and voltage (V) from the voltmeter.
3. Vary the resistance using a rheostat and record the new voltage and current readings.
4. Repeat the experiment for different values of resistance and voltage.
5. Plot a graph of voltage (V) versus current (I). The graph should be a straight line, verifying Ohm's Law (V = IR).

Q26. Magnification of the image is formed by a lens is -1.25 , then an the following questions.

(i) Mention the position of the object on the principal axis

(ii) What is the height of the image, if object size is 2 cm^2

(iii) Mention the characteristics of the image

(iv) What kind of lens is used to get this image?

Solution:

(i) Since magnification is negative, the image is inverted and real. The object is placed beyond the focus (F) and before 2F of a convex lens.

(ii) Magnification (m) = height of the image (h') / height of the object (h)

-1.25 = h' / 2 cm

h' = -2.5 cm

The image height is 2.5 cm (inverted).

(iii) The image formed is real, inverted, and magnified. A negative magnification value confirms that the image is inverted, and since the absolute value of magnification is greater than 1, the image is larger than the object.

(iv) A convex lens is used to obtain this image. Convex lenses can form both real and virtual images, but in this case, since the image is real and inverted, it confirms that the lens used is a convex lens.

Q27. Explain how does the atomic size and ionization energy changes in groups and periods in the Modern Periodic Table.

Solution:

Atomic Size (Atomic Radius):

In a group (top to bottom): Atomic size increases because new electron shells are added, increasing the distance between the nucleus and outer electrons.

In a period (left to right): Atomic size decreases due to an increase in nuclear charge, which pulls electrons closer to the nucleus.

Ionization Energy:

In a group (top to bottom): Ionization energy decreases as atomic size increases. The outer electrons are farther from the nucleus, requiring less energy to remove them.

In a period (left to right): Ionization energy increases because nuclear charge increases, making it harder to remove an electron.

Q28. Write the main features of Bohr's model of Hydrogen atom and mention any two limitations.

Solution:

Main Features of Bohr's Model:

1. Electrons move in fixed orbits around the nucleus without radiating energy.

2. Only certain energy levels are allowed, called quantized energy levels.
3. Electrons absorb or emit energy in discrete amounts when they jump between energy levels.
4. The angular momentum of an electron is quantized, meaning it follows specific values.

Limitations of Bohr's Model:

1. It does not explain the spectra of multi-electron atoms, only hydrogen.
2. It contradicts the uncertainty principle because it assumes fixed electron orbits.