

अभ्यास

CLASS X – SCIENCE

SAMPLE QUESTIONS PAPER (2024-25)

Max. Marks: 80

Time Allowed: 3 hours

General Instructions:

1. All questions would be compulsory. However, an internal choice of approximately 33% would be provided. 50% marks are to be allotted to competency-based questions.
2. Section A would have 16 simple/complex MCQs and 04 Assertion-Reasoning type questions carrying 1 mark each.
3. Section B would have 6 Very Short Answer (VSA) type questions carrying 02 marks each.
4. Section C would have 7 Short Answer (SA) type questions carrying 03 marks each.
5. Section D would have 3 Long Answer (LA) type questions carrying 05 marks each.
6. Section E would have 3 source based/case based/passage based/integrated units of assessment (04 marks each) with sub-parts of the values of 1/2/3 marks.

Section-A

Multiple Choice Questions

1. (D) Hydrochloric acid and sulphuric acid 1
2. (C) Copper and silver 1
3. (B) Displacement reaction 1
4. (A) 6 and 6 1
5. (C) Abscissic acid 1
6. (C) Blue 1
7. (C) Move away from the side AB of the loop 1
8. (D) 2, 4, 2 1
9. (C) Receptors in skin → Sensory neuron → Relay neuron → Motor neuron → Effector muscle in arm 1
10. (C) It has a very small surface area for glucose and oxygen to pass from mother to the embryo. 1
11. (C) The brightness of the image will reduce. 1
12. (D) $\text{Fe}_2\text{O}_3 + 3\text{CO} \rightarrow 2\text{Fe} + 3\text{CO}_2$ 1
13. (D) HCl and NH_4OH 1
14. (D) Translocation 1
15. (C) Pointing into the plane of the paper and out of the plane of the paper respectively. 1
16. (D) Translocation 1

17. (A) Both Assertion (A) and Reason (R) are true and Reason (R) is the correct explanation of Assertion (A). 1
18. (C) Assertion (A) is true, but Reason (R) is false. 1
19. (A) Both Assertion (A) and Reason (R) are true and Reason (R) is the correct explanation of Assertion (A). 1
20. (C) Assertion (A) is true, but Reason (R) is false. 1

Section-B

Very Short Answers Questions

21. (a) Muscle cramps occur due to the accumulation of lactic acid in muscles. This happens when there is insufficient oxygen supply, leading to anaerobic respiration, which produces lactic acid instead of carbon dioxide and water 2
- .Key differences:
- Oxygen availability: Aerobic respiration requires oxygen, while anaerobic respiration occurs without oxygen.
 - Energy yield: Aerobic respiration produces more ATP than anaerobic respiration.
 - End products: Aerobic respiration produces carbon dioxide and water, while anaerobic respiration produces lactic acid.

OR

(b) Another name for lymph: Tissue fluid

• **Functions:**

1. Helps in the transportation of nutrients and oxygen to cells.
2. Plays a key role in immune defense by carrying white blood cells.

2

22. Saturated hydrocarbons burn with a blue flame with no or very little soot.
- Unsaturated hydrocarbons burn with a yellow flame and produce soot.
 - Products of combustion of saturated hydrocarbons: Carbon dioxide (CO₂) and water (H₂O).
23. Movement of leaves of a sensitive plant vs. downward movement of roots:
- The movement of Mimosa pudica (Touch-Me-Not) is a nastic movement (non-directional and independent of the stimulus direction).
 - The downward movement of roots is a tropic movement (directional and influenced by gravity, known as geotropism).

OR

- Hormone regulating carbohydrate, protein, and fat metabolism: Thyroxine
- Gland that secretes it: Thyroid gland
- Importance of iodized salt: Iodine is needed for the synthesis of thyroxine, which regulates metabolism and prevents goiter.

24. Given:

- Object distance, u = -10 cm
- Focal length, f = 15 cm

$$\frac{1}{f} = \frac{1}{v} + \frac{1}{u}$$

$$\frac{1}{15} = \frac{1}{v} + \frac{1}{(-10)}$$

Using the mirror formula:

Solving for v, we get:

$$v = -6 \text{ cm}$$

Thus, the image is formed 6 cm behind the mirror (virtual and erect)

2

25. Low melting and boiling points of carbon compounds indicate they have weak intermolecular forces.
- Non-conductors of electricity suggest they do not have free electrons or ions.

2

26. Given:

- Charge $Q = 750 \text{ C}$
- Current $I = 15 \text{ mA} = 0.015 \text{ A}$

Using the formula:

$$t = \frac{Q}{I}$$

$$t = \frac{750}{0.015} = 50,000 \text{ seconds} = 13.89 \text{ hours}$$

2

Section-C

Short Answers Questions

27. Reaction involved:

3

28. $\text{Fe} + \text{CuSO}_4 \rightarrow \text{FeSO}_4 + \text{Cu}$ $\text{Fe} + \text{CuSO}_4 \rightarrow \text{FeSO}_4 + \text{Cu}$

3

- Type of reaction: Displacement reaction (A more reactive metal replaces a less reactive metal).

Other metals that can be used: Zinc (Zn) and Magnesium (Mg).

Food Chain	Food web
Food chain is defined as the process of energy transfer from producer by a series of organisms with repeated eating or being eaten.	Food web is defined as the interconnected network of food chains at various trophic levels.
Food chain is always straight and proceeds in straight manner	Unlike food chains, food webs are never straight.
The instability increases in the ecosystem by an increase in the number of different and separate food chains.	It provides stability in the ecosystem.
There is no alternative path of food availability	It provides an alternative path of food stability.

If the deer population decreases:

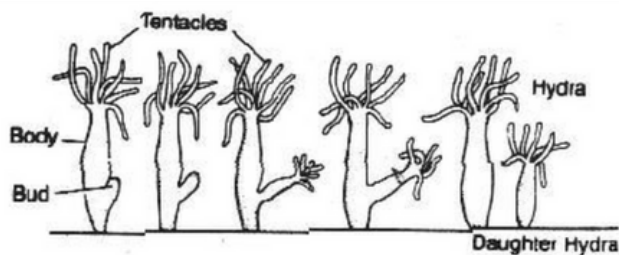
- Grass (1st trophic level) increases.
- Tiger (3rd trophic level) population decreases due to less food.

29. Hydra reproduce asexually by budding, using interstitial cells for reproduction.

3

Steps of budding in Hydra

- A small bud grows on the side of the parent Hydra.
- The bud grows by repeated cell division.
- The bud develops tentacles and a mouth.
- The bud grows into a miniature Hydra.
- When the bud is mature, it detaches from the parent body.
- The bud becomes an independent organism



(b) Roles in human reproduction:

1. Seminal Vesicles :Produce seminal fluid: The seminal vesicles produce a fluid that helps nourish and transport sperm.
2. Store sperm: The seminal vesicles store sperm.
- (ii) Prostate gland:producing seminal fluid, which is a component of semen. It also plays a role in hormone production and helps regulate urine flow.
- (iii) Oviduct:Oviduct → Site of fertilization, transports egg to uterus.
- Testis → Produces sperm and testosterone

30. In this reaction, a molecule of ethanol contains one oxygen atom while ethanoic acid contains two oxygen atoms. Hence, oxygen atom is added during the reaction, therefore, this conversion is an oxidation reaction. Ethanol to ethanoic acid: Oxidation reaction

- Oxidizing agent used: Alkaline KMnO_4 or acidified $\text{K}_2\text{Cr}_2\text{O}_7$

Equation: $\text{C}_2\text{H}_5\text{OH} + 2[\text{O}] \rightarrow \text{CH}_3\text{COOH} + \text{H}_2\text{O}$

Difference from combustion:

- Oxidation is a controlled reaction, while combustion is rapid and produces CO_2 and H_2O .

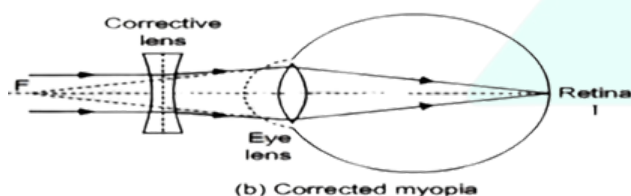
31. (i)The defect of vision represented in the diagram is Myopia (Nearsightedness). This is because the image is formed in front of the retina

(ii)

1. The eyeball is too long.
2. The refractive power of the lens is too strong.

- (iii) Answer: Myopia is corrected using a concave lens, which diverges light rays before they enter the eye so that they can be focused on the retina.

Diagram:

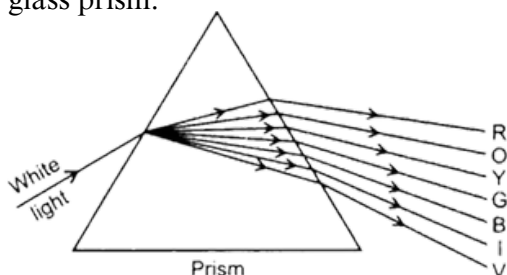


OR

Dispersion of light: The splitting of white light into seven colours on passing through a transparent medium like glass prism is called dispersion of light.

Diagram : Dispersion of light

We get different colours because each colour of light has different bending ability when they pass through the glass prism.



32.
 • Growth hormone (GH): 3
 • Gland of secretion:** GH is produced by the anterior pituitary gland.
 • Role in growth and development:** GH stimulates growth in bones, cartilage, and muscles
 It also plays a role in regulating height during childhood
Regulation of metabolism: GH also has metabolic effects by stimulating the breakdown of fats (lipolysis) for energy, increasing glucose synthesis in the liver
33. The function of the earth wire in electrical instruments: 3
 In every circuit, one wire is connected to the earth, the main function of the earth wire is to protect the sudden damage of the electrical appliances or the electrical instruments due to the sudden voltage increase or the leakage of the current. Earth wire is also used for the safety measures. Accidentally if any current is leaked, earth wire helps to ground the leakage of current.

Necessity of the earth wire in metallic electric appliances:

The metallic body of the electrical instruments will be connected to the earth or ground by means of the earth wire or ground wire, if there will be the leakage of the current the current is sent to the ground by means of earth wire. When the earth wire is connected to the metallic body, it gives the low conducting path to the current. Thus, the earth wire keeps the potential of the leaked current to the earth. So, that the user of the metallic electric component may not get the shock.

Section-D

Long Answers Questions

34. When electricity is made to pass through an aqueous solution of NaCl, it decomposes to form NaOH. This process is called chlor-alkali process because of two products-chlor for Chlorine and alkali for Sodium hydroxide. 5
- (a) Chlor-alkali Process:
- Electrolysis of brine (NaCl solution)
 - Reactions:
 - Gases at electrodes:
 - Anode → Chlorine (Cl_2) gas
 - Cathode → Hydrogen (H_2) gas
 - Uses:
 - $\text{Cl}_2 \rightarrow$ Bleaching, disinfectants
 - $\text{H}_2 \rightarrow$ Fuel, ammonia production
 - Uses: Cl_2 (bleaching), H_2 (fuel).
 - (b) Washing Soda Production:
 - $\text{NaCl} \rightarrow \text{Na}_2\text{CO}_3 \cdot 10\text{H}_2\text{O}$ (Washing soda)
 - Uses: Cleaning, water softening, glass making

“OR”

It involves the reaction of sodium chloride(NaCl), ammonia(NH_3) and carbon dioxide(CO_2) in water. Carbon dioxide(CO_2) involved is produced through calcium carbonate(CaCO_3) and the calcium oxide(CaO) left is used in recovering ammonia(NH_3).
 At first, sodium bicarbonate(NaHCO_3) is obtained which is then converted to sodium carbonate(Na_2CO_3) on heating.

Finally, washing soda($\text{Na}_2\text{CO}_3 \cdot 10\text{H}_2\text{O}$) is produced by the recrystallization of sodium carbonate(Na_2CO_3).

- $\text{NaCl(s)} + \text{NH}_3(\text{g}) + \text{CO}_2(\text{g}) + \text{H}_2\text{O(l)} \rightarrow \text{NaHCO}_3(\text{s}) + \text{NH}_4\text{Cl(aq)}$
Sodium chloride + Ammonia + Carbon dioxide + Water → Sodium bicarbonate + Ammonium chloride
- $2\text{NaHCO}_3(\text{s}) \xrightarrow{\Delta} \text{Na}_2\text{CO}_3(\text{s}) + \text{H}_2\text{O(l)} + \text{CO}_2(\text{g})$
Sodium bicarbonate → Sodium carbonate + Water + Carbon dioxide
- $\text{Na}_2\text{CO}_3(\text{s}) + 10\text{H}_2\text{O(l)} \rightarrow \text{Na}_2\text{CO}_3 \cdot 10\text{H}_2\text{O(aq)}$
Sodium carbonate + Water → Washing soda
- Na_2CO_3 is formed by the combination of a strong base and a weak acid.

Hence, Na_2CO_3 is a basic salt

USES:

1. Washing soda (sodium carbonate) is used in glass, soap and paper industries.
2. It is used in the manufacture of sodium compounds such as borax.
3. Sodium carbonate can be used as a cleaning agent for domestic purposes.
4. It is used for removing permanent hardness of water.

35. (a) Reflex Arc Definition

5

- A pathway followed by nerve impulses during a reflex action.

Sequence of Events (Touching a Hot Object)

1. Receptors in the skin detect heat.
2. Sensory neuron carries impulse to the spinal cord.
3. Relay neuron transmits impulse.
4. Motor neuron sends signal to the muscle.
5. Effector muscle pulls hand away.

36. Components of Nervous System

5

- Peripheral Nervous System (PNS) connects the Central Nervous System (CNS) with the body.
- Two components:
 - Somatic Nervous System (Voluntary actions).
 - Autonomic Nervous System (Involuntary actions)

“OR”

(b) (i) Leaves of Chhui-Mui (Mimosa Pudica) Folding Up

Stimulus:

- The stimulus is touch (also called thigmotropism or seismonastic movement).

Cause of Rapid Movement:

- The movement occurs due to sudden changes in turgor pressure in the cells of pulvini (swollen structures at the base of leaflets).
- When touched, water from the cells moves out, causing the cells to collapse, which results in the folding of leaves.
- This is a defensive mechanism to prevent herbivory.

Is Growth Involved?

- No, growth is NOT involved.
- This is a nastic movement, meaning it is independent of the direction of the stimulus and does not involve permanent growth changes.

(ii) Geotropism in Plants

Definition:

- Geotropism (Gravitropism) is the directional growth of a plant in response to gravity.

Types of Geotropism:

1. Positive Geotropism:

- Growth towards the gravitational force.
- Example: Roots growing downward into the soil.

2. Negative Geotropism:

- Growth away from the gravitational force.
- Example: Shoots growing upward, away from the soil

5

36. (a) Focal Length Determination

- Observation table analysis shows that when object distance (u) is equal to twice the focal length (2f), image distance (v) is also twice the focal length (2f).
- So, focal length = 15 cm.

(b) Incorrect Observation & Correction

- If the image distance does not follow the lens formula:

$$\frac{1}{f} = \frac{1}{v} - \frac{1}{u}$$

- Correction requires ray diagram construction.

(c) Approximate Magnification Calculation

$$M = \frac{v}{u} = \frac{30}{30} = 1$$

- Image size = Object size (Magnification = 1).

36. (a) Principal axis: It is the straight line passing through the pole and centre of curvature of the spherical mirror. This is normal to the mirror at its pole.

5

(b) Radius of Curvature Calculation

$$R = 2 \times f = 2 \times 10 = 20 \text{ cm}$$

Mirror Formula:

$$\frac{1}{f} = \frac{1}{v} + \frac{1}{u}$$

Substituting the values:

$$\frac{1}{15} = \frac{1}{v} + \frac{1}{-10}$$

$$\frac{1}{v} = \frac{1}{15} + \frac{1}{10}$$

Taking LCM of 15 and 10:

$$\frac{1}{v} = \frac{2}{30} + \frac{3}{30}$$

$$\frac{1}{v} = \frac{5}{30}$$

$$v = \frac{30}{5} = 6 \text{ cm}$$

38. • **Between points A and B:** The resistors $4, \Omega$, $6, \Omega$, and $16, \Omega$ are in series.
Total resistance
 $R_{AB} = 4, \Omega + 6, \Omega + 16, \Omega = 26, \Omega$

3

- **Between points B and C:** Two $8, \Omega$ resistors are connected in parallel.
The equivalent resistance of parallel resistors is given by:

3

$$\frac{1}{R_{BC}} = \frac{1}{8} + \frac{1}{8} = \frac{2}{8} = \frac{1}{4}$$

Current Drawn from the Battery:

- The battery voltage is $6, V$.
Using Ohm's Law:

$$I = \frac{V}{R} = \frac{6}{30} = 0.2 A$$

39.

S.No	Self Pollination	Cross Pollination
1.	Transfer of pollen grain from one flower to another flower or within the flower of same plant	Transfer of pollen grain from anther to the stigma of another flower of different plant of same species
2.	Small number of pollen grain required for fertilization	Large number of pollen grain required for fertilisation
3.	Types of fertilization include: - autogamy and geitonogamy	It include :- allogamy
4.	Pollens shed directly onto stigma of same flower of different flower of same plant	Pollens are transferred through wind, insect, water, animal
5.	Smaller flowers are there in compare to cross pollinating flower	Flowers have big petals, are scented, have long stamen and pistils

(b) The part of the flower that attracts insects for pollination is the Petals (Corolla).

Reason:

- Bright colors attract insects.
 - Some flowers also have fragrance and nectar glands to lure pollinators like bees, butterflies, and beetles.
- After fertilization, petals wither and fall off.

(c) Fertilisation is the process in which the male gamete (sperm) fuses with the female gamete (egg) to form a zygote. After fertilisation in a flower, the ovules develop into seeds, while the ovary matures into a fruit, which protects the seeds and aids in their dispersal.

1. Fate of Ovules

- After fertilization, ovules develop into seeds.
- Each fertilized ovule contains a zygote, which later develops into an embryo inside the seed.
- The seed coat forms around the seed to protect it.

38. 2. Fate of Ovary

3

- The ovary develops into a fruit.
- The walls of the ovary thicken to form the pericarp (fruit wall), which protects the seeds and helps in dispersal.

“OR”

(ii) In a germinating seed, plumule is known as future shoot and radicle is known as future root

3

Functions of cotyledons:

Food reserve for the growing seedling.

- Maintaining stable metabolism of the plant embryo.
- Cotyledons develop into the first active organs of photosynthesis.
- Acts as an absorbing organ, that is, absorbs nutrients from the endosperm.

39.

