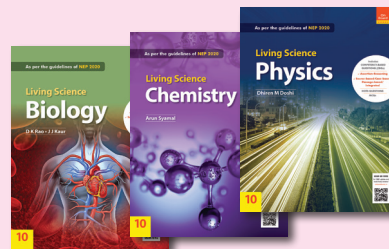


# Sample Question Paper

2022-23



## Class X SCIENCE (086)

Max Marks: 80

Time allowed: 3 hours

### General Instructions:

- This question paper consists of **39 questions** in 5 sections.
- All questions are compulsory. However, an internal choice is provided in some questions. A student is expected to attempt only one of these questions.
- Section A** consists of 20 objective-type questions carrying 1 mark each.
- Section B** consists of 6 Very Short questions carrying 02 marks each. Answers to these questions should be in the range of 30 to 50 words.
- Section C** consists of 7 Short Answer type questions carrying 03 marks each. Answers to these questions should be in the range of 50 to 80 words.
- Section D** consists of 3 Long Answer type questions carrying 05 marks each. Answers to these questions should be in the range of 80 to 120 words.
- Section E** consists of 3 source-based/case-based units of assessment of 04 marks each with sub-parts.

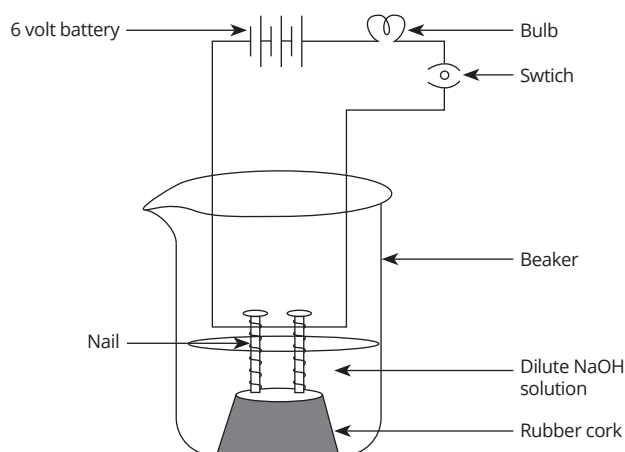
### SECTION – A

Select and write one most appropriate option out of the four options given for each of the questions 1 – 20. 1 mark each.

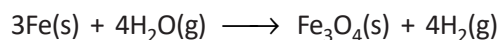
1. The following apparatus has been arranged to demonstrate electrical conductivity.

Which of the following statement(s) is/are correct?

- The bulb won't light up because the electrolyte is not acidic.
  - The bulb will light up because NaOH is a strong base and furnishes ions for conduction.
  - The bulb won't light up because the circuit is incomplete.
  - The bulb won't light up because the electrolyte is neutral.
- a. ii. and iv. b. iv. only  
c. i. and iii. d. ii. only
2. When an excess amount of  $\text{CO}_2$  is passed through the aqueous solution of calcium hydroxide, its milkiness fades away because
- of the evolution of a large amount of heat.
  - calcium oxide is produced.
  - calcium hydrogen carbonate is produced.
  - calcium carbonate is produced.



3. Which of the following statements about the reaction mentioned below are true?



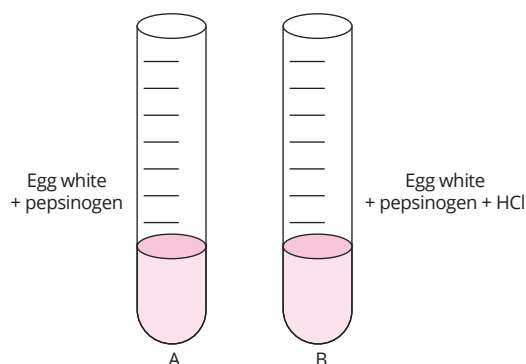
- i. Fe metal is getting oxidised.
  - ii. H<sub>2</sub>O is getting reduced.
  - iii. H<sub>2</sub>O is acting as a reducing agent.
  - iv. H<sub>2</sub>O is acting as an oxidising agent.
- a. i., ii. and iii.
  - b. i. and iv.
  - c. i., ii. and iv.
  - d. ii. and iv.
4. Which of the following combinations of metals float when treated with water?
- a. Manganese and Sodium
  - b. Sodium and Calcium
  - c. Magnesium and Sodium
  - d. Magnesium and Calcium
5. An unknown aqueous solution turns the colour of the red litmus solution to blue. Which of the following solutions should be added to change the colour of the solution back to red?
- a. Baking powder solution
  - b. Lime powder solution
  - c. Ammonium hydroxide solution
  - d. Hydrochloric acid
6. The below-mentioned image displays an element with its symbol, atomic number, and mass number.



Phosphorus

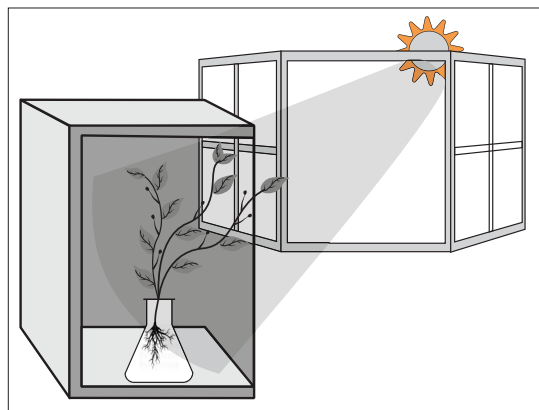
Which of the following options arranges the element in the periodic table?

- a. Group – 1; Period – 1
  - b. Group – 15; Period – 3
  - c. Group – 10; Period – 1
  - d. Group – 5; Period – 3
7. Choose the correct statement out of the given options.
- a. Ethene molecule comprises two carbon atoms and four hydrogen atoms.
  - b. Each carbon atom shares three electrons with three hydrogen atoms to form three C-H single covalent bonds.
  - c. In an ethane molecule, the two carbon atoms share one pair of electrons among themselves to form one C—C single covalent bond.
  - d. All of the above.
8. Which of the following substances are formed in the muscles during vigorous physical exercise that might cause muscle cramps?
- a. Lactic acid + Energy
  - b. Ethanol + Carbon dioxide + Energy
  - c. Carbon dioxide + Water + Energy
  - d. Pyruvate
9. A student arranges an experiment set-up to understand the function of enzymes in the digestion of food. In which of the test tubes given alongside, the digestion of proteins will occur?
- a. Test tube A (as the pepsinogen enzyme will break down the protein into simpler molecules).
  - b. Test tube B (as HCl will break down the protein into simpler molecules).
  - c. Test tube A (as the pepsinogen enzyme will break down into simpler molecules).
  - d. Test tube B (as HCl will activate the pepsinogen enzyme into pepsin for the breakdown of the protein into simpler molecules).



10. Out of the following statements which one is not a direct conclusion that can be drawn from Mendel's Experiment?
- In  $F_1$  generation, only one of the parental traits is expressed.
  - Two copies of each of the parental traits are inherited in a sexually transmitted organism.
  - Natural selection can transform the frequency of inherited traits.
  - A recessive trait is only expressed when both copies of the trait are identical.

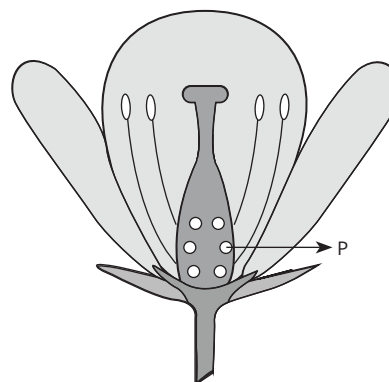
11. A student grew a plant in a conical flask. He placed the conical flask in a cardboard box that was open from one side. The box was kept in a way that its open side faces sunlight near the window. After 2–3 days it was observed that the shoot is bent towards the light as shown in the figure alongside.



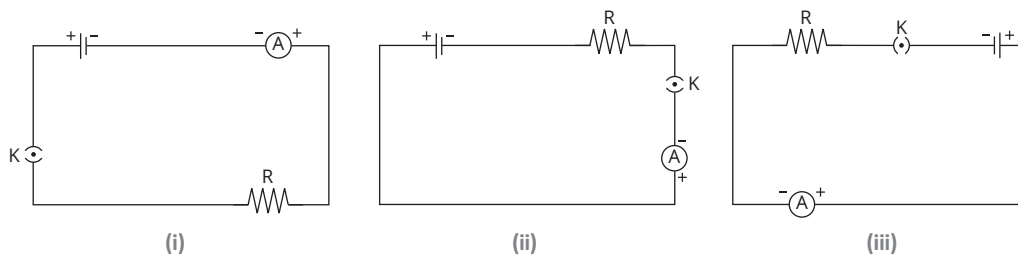
Which type of tropism is being observed in the given figure?

- Geotropism
  - Phototropism
  - Chemotropism
  - Hydrotropism
12. The diagram, given alongside, displays the structure of a flower.

Which process is likely to be disturbed or will not occur if the labelled part P of the flower is removed?



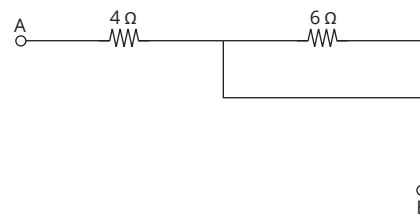
- Formation of fruit
  - Transport of pollen
  - Formation of pollen
  - Expansion of pollen tube
13. A complete circuit is formed by using a cell, a resistor, a key, and an ammeter as shown below in the circuit diagrams (i), (ii) and (iii). The current recorded in the attached ammeter will be



- maximum in (i).
  - maximum in (ii).
  - maximum in (iii).
  - same in all the cases.
14. Which of the following statements is incorrect regarding magnetic field lines?
- The direction of the magnetic field lines at a point is taken to be the direction in which the N-pole of a magnetic compass needle points.
  - Magnetic field lines are formed as closed curves.
  - If the magnetic field lines are parallel and equidistant, they show zero field strength.
  - The relative strength of the magnetic field is shown by the degree of closeness of the lines.

15. The effective resistance between A and B will be

- a.  $4 \Omega$
- b.  $6 \Omega$
- c. May be  $10 \Omega$
- d. Must be  $10 \Omega$



16. To generate a higher amount of electrical power in a hydroelectric power plant, the water is made to fall from a greater height because
- a. its temperature increases.
  - b. a comparatively more significant amount of potential energy (P.E.) is converted into kinetic energy (K.E.).
  - c. the electricity content of water increases with height.
  - d. more water molecules dissociate into ions.

**Q. No. 17 to 20 are Assertion-Reasoning based questions.**

These consist of two statements – Assertion (A) and Reason (R). Answer these questions by selecting the appropriate option given below.

- a. Both A and R are true and R is the correct explanation of A.
  - b. Both A and R are true but R is not the correct explanation of A.
  - c. A is true but R is false.
  - d. A is false but R is true.
17. **Assertion:** When limestone is heated, it decomposes to produce calcium oxide (quicklime) and carbon dioxide.  
**Reason:** A decomposition reaction occurs on application of heat, hence, this is an endothermic reaction.
18. **Assertion:** Traits like tallness and dwarfness in pea plants are inherited independently.  
**Reason:** When a tall pea plant (homozygous) is crossed with a dwarf pea plant, a medium-sized pea plant is obtained in  $F_1$  generation.
19. **Assertion:** Blood maintains water balance to a constant level.  
**Reason:** There is constant exchange of water between circulating blood and tissue fluid.
20. **Assertion:** A steel core is used for making an electromagnet.  
**Reason:** Steel gets permanently magnetised when the current flows through the coil wound around it.

## SECTION – B

**Q. No. 21 to 26 are very short answer questions.**

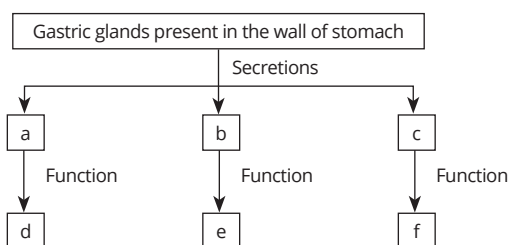
**2 marks each.**

21. A substance X forms a solution that is used for testing the presence of carbon dioxide gas.
- a. Write the equation for the reaction of X with carbon dioxide.
  - b. How is X obtained? (Also, write the chemical equation involved).

**OR**

- a. Define rancidity. Name the types of reactions that are responsible for causing rancidity.
  - b. Write any two methods for preventing rancidity of food.
22. Human brain can be divided on the basis of their diverse functions. Mention three major regions of the human brain. Write one function of each.

23. In wineries, grapes are fermented to make wines. Grapes, when attached to grapevines, do not ferment naturally. They can be fermented only after harvesting. Explain why? What are the conditions needed for this process?
24. Complete the following flow chart by labelling a, b, c, d, e and f.



25. Write four differences between real and virtual images.

**OR**

A convex lens ( $f = 25$  cm) and a concave lens ( $f = 10$  cm) are placed in closed contact. Calculate the power of the combination of the given lenses.

26. List two environment-friendly routines or habits that are needed to be followed by every member of a family or community. Also, explain how these routines will support the “save the environment” mission.

### SECTION – C

**Q. No. 27 to 33 are short answer questions.**

**3 marks each.**

27. a. State the reason why a combustion reaction is an oxidation reaction.  
 b. How will you confirm whether the gas evolved in a chemical reaction is hydrogen gas?  
 c. Why is hydrogen gas not evolved when silver is reacted with dilute sulphuric acid?
28. List three distinguishing features between the processes of galvanisation and alloying.

**OR**

Illustrate an activity to display the conditions under which an iron article rusts.

29. Provide a brief explanation for the following.
- a. How does a squirrel respond to a dangerous situation with help of its hormonal system?  
 b. How are receptors different from effectors?  
 c. What are nastic and curvature movements?
30. The refractive indices of water and glass with respect to air are  $\frac{4}{3}$  and  $\frac{3}{2}$  respectively. If the speed of light in glass is  $2 \times 10^8$  ms<sup>-1</sup> then find the speed of light in a. air and b. water.
31. Define spectrum. Why do different coloured rays deviate separately on passing through a glass prism?
32. A coil made up of copper metal is connected to a galvanometer. What changes will be observed if a bar magnet is
- a. pushed inside the coil with its N-pole entering first?  
 b. held at rest inside the coil?  
 c. pulled out again?

**OR**

What is a fuse and how does it work?

33. Sustainable management of natural resources is very important as per the current scenario. Why? Out of the two – Reuse and Recycle – which, in your opinion is better to practice? Give reason.

### SECTION – D

Q. No. 34 to 36 are long answer questions.

5 marks each.

34. A compound C with the molecular formula  $C_2H_4O_2$  reacts with Sodium metal to form a compound R and evolves as a gas that burns with a pop sound. Compound C on reaction with alcohol A in the presence of an acid forms a sweet-smelling compound S with the molecular formula  $C_3H_6O_2$ . On adding NaOH to compound C, it produces R and  $H_2O$  and, S on treatment with NaOH solution gives back R and A. Identify C, R, A and S and write down all the reactions involved.

OR

- a. What are homologous series of compounds? List any two characteristics.
- b. What will happen if we add a 5% solution of alkaline  $KMnO_4$  drop by drop to a warm solution of ethanol taken in a test tube?
- c. What will be the name of the compound formed during the chemical reaction? How would you distinguish between an alcohol and a carboxylic acid on the basis of their chemical properties?
35. With the help of a well-labelled diagram, explain the process of reproduction by spores in *Rhizopus*.

OR

What is the effect of DNA copying on the reproduction process which is not perfectly accurate? How does the amount of DNA remain constant through each new generation as a combination of DNA copies of two individuals?

36. A wire made up of copper metal has a diameter of 0.5 mm and resistivity of  $1.6 \times 10^{-8} \Omega m$ . Calculate the length of the wire to make resistance of 100  $\Omega$ . How much does the resistance change if the diameter of the wire is doubled without changing its length?

### SECTION – E

Q. No. 37 to 39 are case-based/data-based questions with 2 to 3 short sub-parts. Internal choice is provided in one of these sub-parts.

4 marks each

37. The samples of four metals A, B, C and D were added to the four below-mentioned solutions one by one. The results obtained have been tabulated as follows.

Metal	Iron (II) sulphate	Copper (II) sulphate	Zinc sulphate	Silver nitrate
A	No reaction	Displacement	—	—
B	Displacement	—	—	—
C	No reaction	No reaction	No reaction	Displacement
D	No reaction	No reaction	No reaction	No reaction

Use the aforementioned table to answer the following questions about metals A, B, C and D.

- a. Which out of the four is the most reactive metal?
- b. What would be observed if metal B is added to a solution of copper (II) sulphate?
- c. Arrange the given metals in the order of decreasing reactivity.

OR

- c. Which out of the four is the least reactive metal?

38. There are many traits or characteristics which are developed in response to external environment. But many of the characteristics are passed from parents to offspring. Raju, a curious student has surveyed the type of earlobes of his classmates and observed that there are two types of lobes – free and attached. He made a list and found that seven out of twenty students had fused earlobes and the remaining ones showed free earlobes.



Free earlobe

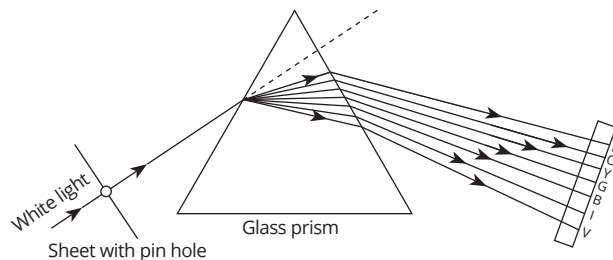


Attached earlobe

- Acquired traits are not capable of directing evolution. Justify.
- Differentiate between acquired and inherited traits.
- What is the physical basis of heredity?

OR

- Variation in an individual may be advantageous or harmful. Explain.
39. When white light is incident on one of the refracting surfaces of the prism, the light diverges into constituent colours violet, indigo, blue, green, yellow, orange and red. The process of splitting of the white light into its seven constituent colours is known as dispersion. When this dispersed white light is made to fall on a screen, we obtain the band of seven colours which is called the spectrum of white light. Red colour bends the least on passing through the prism and violet colour bends the maximum on passing through the prism.



- What will happen when a red-coloured light is passed through a prism?
- Which type of spectrum is produced by white light when it is passed through a glass prism?
- Why does red light bend the least while violet light bends the most during dispersion?

OR

- Explain the cause of dispersion of white light through a prism.