Sample Question Paper

2024–25

Class X
SCIENCE (086)

Max Marks: 80 **Time allowed: 3 hours**

General Instructions:

i. All questions would be compulsory. However, an internal choice of approximately 33% would be provided. 50% marks are to be alloted to competency-based questions.

ii. **Section A** would have 16 simple/complex MCQs and 04 Assertion-Reasoning type questions carrying 1 mark each.

iii. **Section B** would have 6 Very Short Answer (VSA) type questions carrying 02 marks each.

iv. **Section C** would have 7 Short Answer (SA) type questions carrying 03 marks each.

v. **Section D** would have 3 Long Answer (LA) type questions carrying 05 marks each.

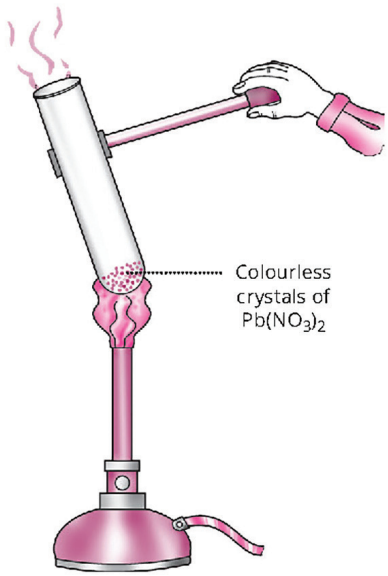
vi. **Section E** would have 3 source-based/case-based/passage based/integrated units of assessment (04 marks each) with sub-parts of the values of 1/2/3 marks.

SECTION – A

Questions 1 to 16 are multiple-choice questions. Only one of the choices is correct. Select and write the correct choice as well as the answer to these questions.

1. Why the manufacturers of potato chips fill the bag containing chips with nitrogen gas.
   a. It keeps the insects away from chips?
   b. It prevents chips from spilling out when the pack is opened.
   c. It keeps the chips dry if the packet falls in water.
   d. It prevents rancidity of chips.
2. Which of the following is a necessary condition for all chemical reactions?
   a. Energy in the form of heat or light should be supplied to the reactants.
   b. The reactants should be at the same temperature.
   c. All the reactants should be in the same physical state.
   d. There should be physical contact between the reactants.
3. In two separate test-tubes, a solution of pH 2 is filled. A few drops of phenolphthalein is added to one test-tube. To the second test-tube, a few drops of methyl orange is added. Which of the following options is correct regarding change in colour of the indicators?
   a. Methyl orange: red; phenolphthalein: pink
   b. Methyl orange: red; phenolphthalein: colourless
   c. Methyl orange: orange; phenolphthalein: pink
   d. Methyl orange: orange; phenolphthalein: colourless
4. Two salts A and B are dissolved in water separately. Phenolphthalein is added to these two solutions. Solution A turns pink while there is no change in colour in the solution B. Salts A and B are
   a. $NaNO_3$ and Na_2SO_4
   b. Na_2CO_3 and NH_4Cl
   c. NH_4Cl and Na_2SO_4
   d. Na_2SO_4 and $NaHCO_3$

5.



Identify the product which evolved during the above reaction.

a. Colourless carbon dioxide
b. Reddish–brown nitrogen dioxide
c. Light yellow oxygen
d. Colourless nitrogen

6. In the following redox reaction:

$$Fe_2O_3 + CO \rightarrow 2Fe + 3CO_2$$

a. Fe_2O_3 is oxidised to Fe, and CO is reduced to CO_2.
b. Both Fe_2O_3 and CO are oxidised to Fe and CO_2, respectively.
c. Fe_2O_3 is reduced to Fe, and CO is oxidised to CO_2.
d. Both Fe_2O_3 and CO are reduced to Fe and CO_2, respectively.

7. Match Column I with Column II and select the correct option using the given codes.

COLUMN I	COLUMN II
(i) Methane	(A) carbon-carbon double bond
(ii) Ethane	(B) CH_4
(iii) Propane	(C) contains –COOH functional group
(iv) Methanoic acid	(D) homologous series with methane

a. (i) – (A), (ii) – (B), (iii) – (C), (iv) – (D)
b. (i) – (B), (ii) – (A), (iii) – (C), (iv) – (D)
c. (i) – (A), (ii) – (B), (iii) – (D), (iv) – (C)
d. (i) – (B), (ii) – (A), (iii) – (D), (iv) – (C)

8. All green plants are considered as producers. Producers always show

a. heterotrophic nutrition.
b. autotrophic nutrition.
c. both heterotrophic and autotrophic nutrition.
d. neither autotrophic nor heterotrophic nutrition.

9. Motor nerve carries the message to

a. sensory organ.
b. spinal cord.
c. effector organ.
d. brain.

10. Rajib has to select an organism from the following list that reproduces through budding. He correctly selects
    a. *Amoeba*.
    b. Yeast.
    c. *Plasmodium*.
    d. *Leishmania*.

11. In a Mendelian experiment, tall pea plant having violet-coloured flowers were bred with short pea plant having white flowers. The progeny bore violet flowers but half of them were short. The genetic make-up of tall parent can be
    a. TTWW.
    b. TTww.
    c. TtWw.
    d. TtWW.

12. Internal respiration/cellular respiration is
    a. the oxidation of food to release energy.
    b. breathing in and releasing oxygen in the tissue.
    c. the synthesis of complex substances.
    d. transporting out CO_2 from tissues.

13. A ray of light is incident on a concave mirror. If it is parallel to the principal axis, the reflected ray will
    a. pass through the focus.
    b. pass through the centre of curvature.
    c. pass through the pole.
    d. retrace its path.

14. When a ray of light travels obliquely from a rarer to a denser medium,
    a. it bends towards the normal.
    b. it bends away from the normal.
    c. it goes undeviated.
    d. it is reflected back.

15. In the atmosphere, oxygen is converted into ozone by the action of
    a. ultraviolet radiations.
    b. gamma radiations.
    c. infrared radiations.
    d. cosmic radiations.

16. In a food chain of plants, frog, snake and vulture, there are pesticides sprayed on plants. Then, which of the following will have the maximum concentration of pesticides in the body?
    a. Plants
    b. Frog
    c. Snake
    d. Vulture

Question No. 17 to 20 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, and 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 (A):** In a redox reaction, the oxidising agent gets oxidised and the reducing agent gets reduced.
    Reason (R): The substance which gets reduced acts as an oxidising agent and the substance which gets oxidised acts as a reducing agent.

18. **Assertion (A):** A true-breeding tall pea plant when crossed with a true-breeding dwarf pea plant, it is called a monohybrid cross.
    Reason (R): Monohybrid cross is a cross between two parents having contrasting forms of a single trait.

19. **Assertion (A):** The direction of magnetic field lines, outside the magnet, is from the north pole to the south pole.
    Reason (R): The north pole of a magnet always has a stronger magnetic field around it than the south pole.

20. **Assertion (A):** Ozone hole indicates a region of ozone layer that has become thinner.
    Reason (R): Destruction of ozone layer is mainly due to fluorine atoms present in chlorofluorocarbons.

SECTION – B

Q. No. 21 to 26 are very short answer questions. **2 marks each.**

21. In whitewashing of walls, water-soluble slaked lime [$Ca(OH)_2$] is used. But the product on the walls is insoluble in water.
    a. Can you suggest the chemical change which occurs on the walls?
    b. Name the type of reaction.
22. Why reproduction is essential for living organisms?
23. What is the purpose of pericardial fluid? State four functions of blood in the circulatory system.

OR

What happens to the glucose which enters the nephron tubule along with the filtrate?

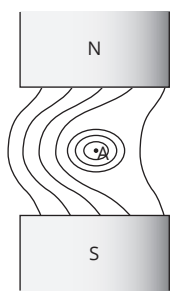
24. Following table gives the values of refractive indices of a few media.

S. No.	MEDIUM	REFRACTIVE INDEX
A	Water	1.33
B	Crown glass	1.52
C	Rock salt	1.54
D	Diamond	2.42

    a. Use this table to give an example of
        i. a pair of media such that light speeds up when it goes from one of these media to another.
        ii. a pair of media such that light slows down when it goes from one of these media to another.
    b. In which medium, the speed of light will be maximum.
25. A piece of wire of resistance R is cut into five equal parts. These parts are then connected in parallel. If the equivalent resistance of this combination is R', what is the value of the ratio $R : R'$?

OR

A current-carrying wire is placed between the poles of a magnet. The wire carries an electric current out of the plane of the paper. The current carrying wire and the magnet generate a magnetic field. Due to the interactions between the two magnetic fields, the resulting shape of magnetic field is shown in the figure given.



    a. Which side of the point A – left or right – indicates a stronger magnetic field? How it is apparent in the figure?
    b. What is the direction of the force acting on the current-carrying wire?
26. Consider the following food chain:

Grass → Goat → Tiger.

If the tiger has 30 J of energy available in this food chain, how much energy was originally available from grass? Explain.

SECTION – C

Q. No. 27 to 33 are short answer questions. **3 marks each.**

27. Identify the types of reaction mentioned below in (a) and (b). Give one example for each type in the form of a balanced chemical equation.
    a. $AB \rightarrow A + B$
    b. $A + BC \rightarrow AC + B$

28. a. i. A metal carbonate reacts with a solution A and as a result a salt, water and a gas B is formed. What are A and B?
    ii. An oxide of an element P reacts with an acid to form salt and water. Before the reaction, what will be the possible value of pH and the type of element?
    iii. An acid and a base conduct electricity because of the presence of ions in it. What are the ions present in an acid and a base?

OR

    b. Answer the following questions.
    i. Why tap water conducts electricity but distilled water does not?
    ii. The pH of a sample of tomato juice is 4.6. How is this juice likely to be in taste?
    iii. What is the role of tartaric acid in baking powder?

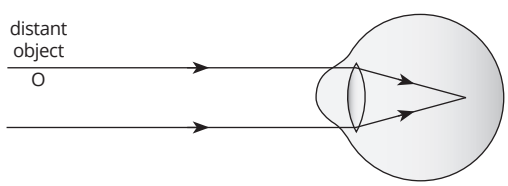
29. What is the importance of hindbrain in controlling the actions of our body?

30. a. The attached earlobes in human is an inherited condition. For attached earlobes, the allele is recessive. If both the parents have attached earlobes, what are the chances the child will have attached earlobes?
    b. Which chromosomes can be used to determine whether a forensic sample of tissues is from male or female? Give reason for it.

31. a. What is the difference between a real image and a virtual image?
    b. We wish to obtain an equal sized inverted image of a candle flame on a screen kept at a distance of 4 m from the candle flame.
    i. Name the type of lens that should be used.
    ii. What should be the focal length of the lens and at what distance from the candle flame should the lens be placed?
    iii. Draw a labelled diagram to show the image formation in this case.

32. a. State Ohm's law. Draw a schematic diagram of the circuit for studying Ohm's law.
    b. States Joule's law of heating.

33. Answer the following questions based on the diagram given below.



    a. Which defect of vision is represented in the given diagram?
    b. List two causes of this defect.
    c. How this defect of vision is corrected? Draw a suitable diagram to explain it.

SECTION – D

Q. No. 34 to 36 are long answer questions. **5 marks each.**

34. An organic compound A is widely used as a preservative in pickles and has a molecular formula $C_2H_4O_2$. This compound reacts with ethanol to form a sweet-smelling compound B.

    a. Identify the compound A. Write the chemical equation for its reaction with ethanol to form the compound B.

    b. How can you get back compound A from compound B? Name the process and write the corresponding chemical equation.

    c. Which gas is produced when compound A reacts with washing soda?

OR

The formulae of five organic compounds are given below:

A	B	C	D	E
C_2H_4	CH_3COOH	C_2H_5OH	C_2H_6	C_6H_6

    a. Which one of these compounds A, B, C, D or E is a saturated hydrocarbon?

    b. Which of the above compounds when heated at 443 K in the presence of concentrated H_2SO_4 forms ethene as the major product? What is the role played by concentrated H_2SO_4 in this reaction? Also write the chemical equation involved.

    c. Give the chemical equation when B reacts with C in the presence of concentrated H_2SO_4. Name the major product formed and mention one of its important use.

35. In human males, the structures 'X' in the reproductive system are cut surgically and ligated at both ends to prevent the passage of gamete 'A' from the organ 'B' where they are made. Since 'A' cannot come out, they cannot fuse with the gamete 'D' in the body of female and pregnancy is prevented.

    a. Name the surgical method described above in males.

    b. What is the surgical method in females for birth control on the similar lines? Are these methods reversible?

    c. Name the structures 'X' and organ 'B'.

    d. Name the cells 'A' and 'D'.

OR

    a. Pradeep is caught in a tough situation. His heartbeat has increased, mouth has become dry and the pupils of his eyes are dilated. Name the hormone causing these changes.

    b. Which gland is responsible for releasing this hormone?

    c. Name any other hormone(s) released by this gland and explain its/their functions.

    d. Name the hormone produced by the thyroid gland and state its function in the body.

36. a. What is a lens?

    b. Distinguish between a convex and a concave lens.

    c. Draw a ray diagram to show the refraction of light through a rectangular glass slab.

    d. If the power of a lens is +5 dioptre, what is its focal length?

OR

    a. Explain two characteristics of concave lenses.

    b. Define the focal length of a concave lens and discuss its significance in terms of image formation.

    c. Describe two common applications of concave lenses in optical devices, providing examples for each.

SECTION – E

Q. No. 37 to 39 are case-based/data-based questions. **4 marks each**

37. The table given below shows the hints given by the quiz master in a quiz.

S. No.	HINT
(i)	A compound 'A' ($C_2H_4O_2$) reacts with Na metal to form a compound 'B'.
(ii)	It evolves a gas which burns with a pop sound.
(iii)	Compound 'A' on treatment with an alcohol 'C', in the presence of an acid, forms a sweet smelling compound 'D' ($C_3H_6O_2$).
(iv)	Addition of NaOH to 'D' gives back 'B' and 'C'.

Based on the above hints answer the following questions.

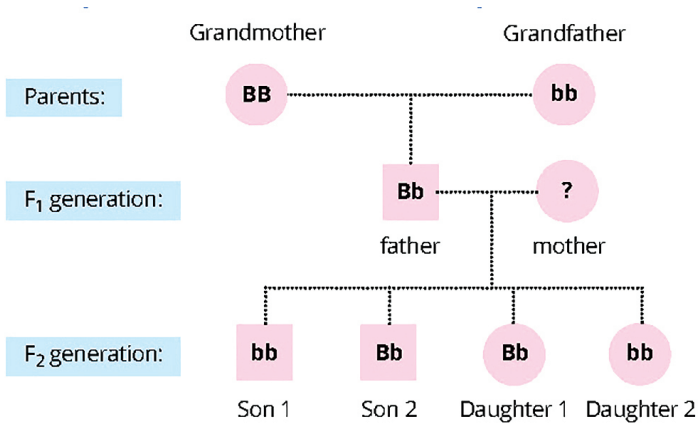
a. Identify 'A', 'B', 'C' and 'D.'

b. Give the IUPAC names of 'A', 'B', 'C' and 'D.'

OR

Write the chemical reactions for the changes taking place

38. Rina has to solve a pedigree chart question provided in her class test. In human beings, the gene for blue eyes (b) is recessive to the gene for brown eyes (B). The diagram below represents part of the pedigree chart in which some have brown eyes and some have blue eyes.



a. Using the symbols given above, write the genotype of mother in the space provided.

b. What is the phenotype of the grandfather?

c. What is the ratio of individuals with brown eyes to those with blue eyes in the F_2 generation?

OR

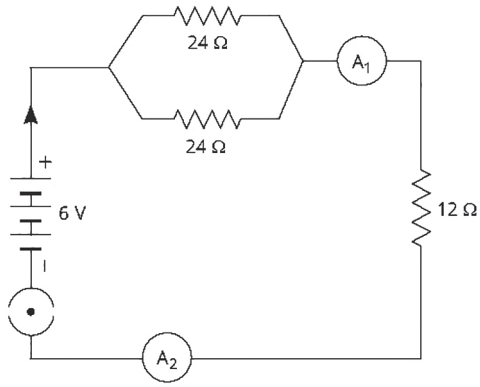
If a boy has brown eyes and his mother is blue eyed, what would be the genotype of his father and mother? Why do you think blue eye colour trait is recessive in nature? Data from how many generations are needed to identify a dominant or recessive trait?

39. a. How will you infer with the help of an experiment that the same current flows through every part of the circuit containing three resistors R_1, R_2 and R_3 connected in series to a battery of V volts?

b. Study the following circuit and find out:

i. current in 12 Ω resistor.

ii. difference in the readings of ammeters A_1 and A_2, if any.



c. Define electric power. An electrical device of resistance *R* is connected across of voltage *V* and draws a current *I*. Derive an expression for power in terms of current and resistance.

OR

Two electric bulbs rated 100 W; 220 V and 60 W; 220 V are connected in parallel to an electric mains of 220 V. Find the current drawn by the bulbs from the mains.