Sample Paper 03

Class X 2026-27

Science (086)

Time: 3 Hours

Max. Marks: 80

General Instructions:

1. This question paper consists of 39 questions in 3 sections. Section A is Biology, Section B is Chemistry and Section C is Physics.
2. 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

1. Photosynthesis is the process by which green plants prepare their own food. Which of the following are the essential raw materials for this process?
(a) Oxygen, Water, and Sunlight
(b) Carbon Dioxide, Oxygen, and Water
(c) Sunlight, Chlorophyll, and Oxygen
(d) Carbon Dioxide, Water, and Sunlight

2. Hormones regulate various functions in the human body. Which hormone is primarily responsible for the development of secondary sexual characteristics in males?
(a) Oestrogen
(b) Testosterone
(c) Adrenaline
(d) Insulin

3. Organisms reproduce either sexually or asexually. What is the most significant difference between these two methods?
(a) Asexual reproduction is a very slow process compared to sexual reproduction.
(b) Asexual reproduction results in genetic variation, while sexual reproduction produces clones.
(c) Asexual reproduction involves one parent, while sexual reproduction typically involves two parents.
(d) Asexual reproduction occurs only in unicellular organisms, and sexual reproduction only in multicellular ones.

4. In genetics, a single gene can exist in different variations or forms. What is the term for these alternative forms of a gene?
(a) Alleles
(b) Phenotype
(c) Zygote
(d) Chromosome

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5. Energy flows through an ecosystem from one trophic level to the next. What is considered the ultimate source of energy for nearly all food chains on Earth?
(a) Green plants
(b) Geothermal vents
(c) The Sun
(d) Decomposers

6. Consider the following statements about cellular respiration:
(i) Aerobic respiration occurs in the mitochondria and requires oxygen.
(ii) Anaerobic respiration in human muscles produces ethanol and energy.
(iii) Aerobic respiration yields a much larger amount of ATP than anaerobic respiration.
(iv) The final step in anaerobic respiration is the breakdown of pyruvate into water and carbon dioxide.
Which of the above statements are correct?
(a) (i) and (iii)
(b) (ii) and (iv)
(c) (i), (ii), and (iii)
(d) All are correct.

7. The different parts of a flower are specialized for various roles in reproduction. What are the primary functions of the sepals and petals?
(a) Produce eggs and produce pollen.
(b) Protect the bud and attract pollinators.
(c) Attract pollinators and protect the bud.
(d) Develop into a seed and develop into a fruit.

8. **Assertion (A) :** Arteries are blood vessels with thick and elastic walls.
Reason (R) : The blood emerges from the heart under high pressure and flows through the arteries
(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.

9. **Assertion(A) :** The concentration of harmful, non-biodegradable chemicals increases at higher trophic levels in a food chain.
Reason (R) : These chemicals are easily broken down and metabolized by the organisms at each trophic level.
(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.

10. In the human heart, the wall of the left ventricle is significantly thicker than the wall of the right ventricle. Provide a reason for this structural difference.

11. Attempt either option A or B.
A. Differentiate between autotrophic and heterotrophic modes of nutrition by giving one key difference and one example for each.

OR

B. What is lymph? State two major functions of the lymphatic system in the human body.

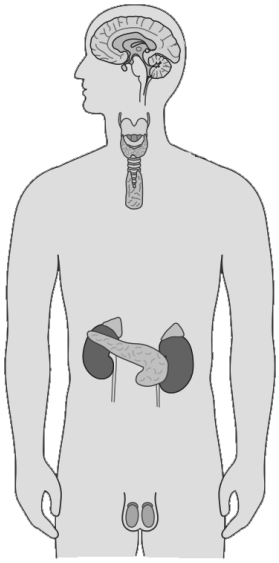
12. If a pesticide like DDT is sprayed on a field, it enters the food chain: Grass → Goat → Human. In which organism will the concentration of this pesticide be the highest? Name the phenomenon and explain why.

13. Draw a diagram showing the location of the major endocrine glands in the human body and label the following:

(i) Thyroid Gland

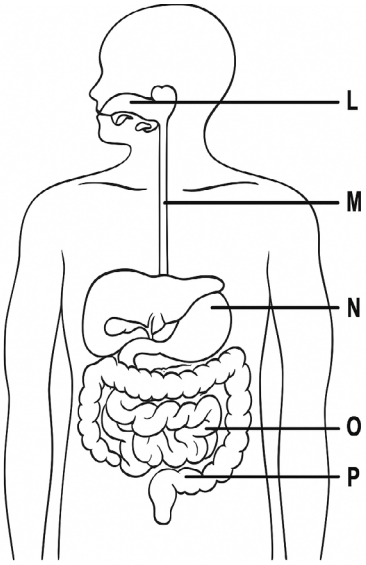
(ii) Adrenal Gland

(iii) Pituitary Gland



14. Explain the mechanism of sex determination in human beings. With the help of a cross, show why the statistical probability of a baby being a boy or a girl is 50%.

15. A person ate a piece of buttered toast. Refer to the figure of the human alimentary canal to the questions.



A. The butter is rich in fats. Explain the role of the organ labelled 'N' (Liver) and its secretion in the digestion of fats.

OR

B. The toast is rich in carbohydrates. Where does its digestion start and which enzyme from the gland labelled as part of 'N' (Pancreas) helps in its further digestion in the small intestine?

C. Explain the process of peristalsis and its role in the part labelled 'M' (Oesophagus).

16. Attempt either option A or B

A. (i) What are the male and female gametes in flowering plants? Where are they produced?
(ii) Differentiate between unisexual and bisexual flowers with one example of each.
(iii) Why is it advantageous for a plant to be cross-pollinated?

OR

B. (i) Define puberty. List two changes observed in girls and two in boys during this time.
(ii) What is the function of the testes and ovaries in the human reproductive system, apart from producing gametes?
(iii) Name two barrier methods of contraception.

SECTION-B

17. Analyze the following equations. Which statement correctly identifies the redox reaction and the values of 'p' and 'q'?

Equation 1:

$$p\,CuSO_4(aq) + Fe(s) \rightarrow FeSO_4(aq) + Cu(s)$$

Equation 2:

$$CaCO_3(s) \xrightarrow{Heat} CaO(s) + qCO_2(g)$$

(a) Both are redox reactions; p = 1, q = 1
(b) Only Equation 1 is a redox reaction; p = 1, q = 1
(c) Only Equation 2 is a redox reaction; p = 1, q = 2
(d) Both are redox reactions; p = 2, q = 1

18. Most non-metal oxides are acidic in nature, but some are neutral. Which of the following is a neutral oxide?

(a) SO_2 (Sulphur dioxide)
(b) CO_2 (Carbon dioxide)
(c) P_2O_5 (Phosphorus pentoxide)
(d) CO (Carbon monoxide)

19. A student performs experiments with four unknown metals A, B, C, and D. The observations are as follows:

1. Metal A displaces Metal B from its salt solution.
2. Metal B displaces Metal C from its salt solution.
3. Metal C displaces Metal D from its salt solution.

Based on these results, what is the correct order of decreasing reactivity?

(a) D C B A
(b) A B C D
(c) C B A D
(d) B A D C

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20. A curry stain on a white cloth is yellow in colour. When soap is scrubbed on it, the stain turns reddish-brown. What is the nature of soap and why does the colour change?
(a) Soap is acidic, and it reacts with the stain.
(b) Soap is neutral, and it cleans the stain.
(c) Soap is basic, and the turmeric in the curry acts as a natural indicator.
(d) Soap is acidic, and it bleaches the colour of the stain.

21. A student takes 10 mL of a hydrochloric acid solution (pH = 2) in a beaker and adds 90 mL of distilled water to it. What will be the effect on the pH of the final solution?
(a) The pH will decrease.
(b) The pH will increase.
(c) The pH will remain unchanged.
(d) The pH will become 1.

22. A student mixes a solution of dilute hydrochloric acid with a solution of sodium hydroxide. Which of the following correctly represents the products of this reaction?
(a) Sodium chloride and hydrogen gas
(b) Sodium chloride, water, and chlorine gas
(c) Sodium oxide and water
(d) Sodium chloride and water

23. A pale yellow powder, silver bromide, is kept in a china dish in the open. After some time, its colour changes to grey. This change is an example of a:
(a) Combination reaction
(b) Photolytic decomposition reaction
(c) Displacement reaction
(d) Precipitation reaction

24. **Assertion (A) :** Covalent compounds, like methane and ethanol, generally have low melting and boiling points.
Reason (R) : The intermolecular forces of attraction between the molecules of covalent compounds are very weak.
(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.

25. Answer the following based on the physical properties of metals:
(a) Why are metals like gold and platinum, which are described as 'noble metals', exceptionally suitable for making jewellery? Give a reason based on their chemical property.
(b) Sodium is a metal, yet it is stored in kerosene and can be easily cut with a knife. What does this indicate about the physical hardness and chemical reactivity of sodium?

26. Attempt either option A or B.
(A) A highly exothermic reaction between aluminium powder and iron(III) oxide is used for welding purposes on site.
(i) Give the common name of this reaction.
(ii) Write the balanced chemical equation for the reaction, indicating the physical states of the reactants and products.
(iii) Explain why the product of this reaction is useful for welding.

OR

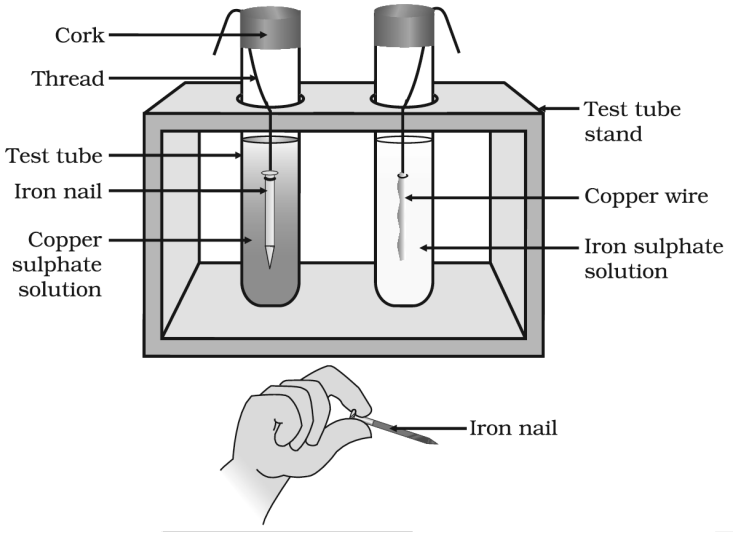
(B) Ionic compounds exhibit a unique set of physical properties due to the nature of the ionic bond.

(i) Explain why ionic compounds are generally hard, crystalline solids with high melting points.

(ii) Why do ionic compounds conduct electricity when dissolved in water or in the molten state, but not in the solid state?

(iii) Are ionic compounds typically soluble in an organic solvent like kerosene? Give a reason.

27. A student places a clean iron nail in a test tube containing a blue solution of copper sulphate. In another test tube, she places a copper wire in a freshly prepared pale green solution of ferrous sulphate.



(a) What changes would she observe in the first test tube containing the iron nail after 30 minutes?

(b) Write the balanced chemical equation for the chemical reaction that occurred in the first test tube.

(c) Would she observe any reaction in the second test tube? Justify your answer based on the reactivity series.

28. Attempt either the main question or the OR option.

A white chemical compound 'P' has the formula $CaSO_4 \cdot \frac{1}{2}H_2O$. It is prepared by carefully heating another calcium compound, Gypsum. This powder 'P' is widely used in hospitals and for making decorative items.

(a) Identify the compound 'P' and write its common name.

(b) Write the balanced chemical equation for the preparation of 'P' from Gypsum.

(c) Explain why 'P' must be stored in a moisture-proof container. Write the chemical equation for the change that occurs if it is not.

OR

Bleaching powder is a yellowish-white solid used for various purposes, including disinfecting drinking water supplies and as a bleaching agent for cotton in the textile industry. It is produced by the action of a specific gas on dry slaked lime.

(a) What is the chemical name and formula for bleaching powder?

(b) Name the gas used in its preparation and write the balanced chemical equation for the reaction.

(c) What happens when bleaching powder is exposed to air for a long time? Explain why it loses its effectiveness.

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29. Attempt either option A or B.

(A) Soaps are molecules that have two ends with different properties. This unique structure is key to their cleansing action.

(a) What are the two distinct parts of a soap molecule called? Describe their affinity towards water.

(b) With the help of a labelled diagram, show the formation of a micelle when soap is dissolved in water.

(c) Explain how these micelles help in washing away oily dirt from clothes.

(d) Why are detergents considered more effective cleansing agents than soaps, especially in hard water?

OR

(B) Hydrocarbons are classified as saturated or unsaturated, and they undergo characteristic chemical reactions.

(a) Differentiate between saturated and unsaturated hydrocarbons. Give one example for each class.

(b) What type of reaction converts vegetable oils into solid fats (vanaspati ghee)? Name the catalyst used in this process.

(c) Write a balanced chemical equation showing the conversion of ethene (C_2H_4) to ethane (C_2H_6).

(d) Saturated hydrocarbons are relatively unreactive but undergo substitution reactions. What is a substitution reaction?

(e) Give one reason why the reaction between methane and chlorine ($CH_4 + Cl_2 \rightarrow CH_3Cl + HCl$) is considered a substitution reaction.

SECTION-C

30. A student is studying about magnification produced by spherical mirrors and makes the following statements:

I. The magnification produced by a convex mirror is always positive and less than one.

II. The magnification produced by a concave mirror can be positive, negative, or one.

III. A magnification of -2 means the image is real, inverted, and twice the size of the object.

Choose from the following the correct option that lists the correct statements.

(a) I and II

(b) I and III

(c) I, II and III

(d) II and III

31. During a laboratory experiment, a student observes that the path of light through a rectangular glass slab is bent twice. Choose the correct option that describes this phenomenon.

(a) Light undergoes two refractions: at the entry surface and at the exit surface.

(b) Light undergoes one reflection and one refraction.

(c) The bending of light is due to scattering by the glass molecules.

(d) The path of light is bent due to dispersion and reflection.

32. **Assertion (A) :** A convex lens always produces a real image of an object.

Reason (R) : A convex lens converges parallel rays of light to a single point, forming a real image.

(a) Both A and R are true, and R is the correct explanation of A.

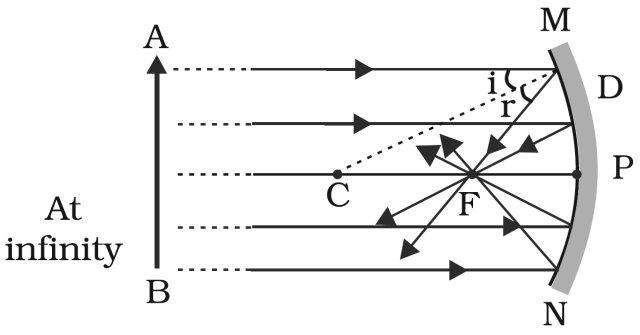
(b) Both A and R are true, and R is not the correct explanation of A.

(c) A is true but R is false.

(d) A is false but R is true.

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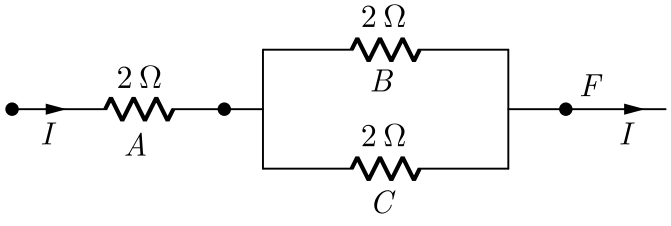
33. The diagram shows a concave mirror reflecting rays of light.



A. Explain what is meant by the principal focus of a concave mirror.
B. State the mathematical relationship between the radius of curvature and focal length of a spherical mirror.
C. Draw a ray diagram for image formation when the object is placed at infinity.

34. Attempt either option A or B

A. Three $2\,\Omega$ resistors A, B and C are connected as shown in figure. Each of them dissipates energy and can withstand a maximum power of 18 W without melting. Find the maximum current that can flow through the three resistors.



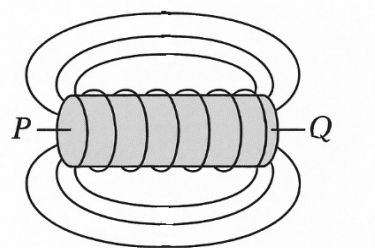
OR

B. A wire is cut into three equal parts and then connected in parallel. How will its :
(a) Resistance
(b) Resistivity get effected ?

35. A person wears spectacles of power $-2.5\,\mathrm{D}$. Name the defect of vision he is suffering from. Draw the ray diagram for (i) the defective eye, (ii) its correction after using a suitable lens.

36. Two resistors of resistances $3\,\Omega$ and $6\,\Omega$ respectively are connected to a battery of 6 V so as to have :
(a) Maximum resistance,
(b) Maximum current.
(i) How will you connect the resistances in each case ?
(ii) Calculate the strength of the current in the circuit in both cases.

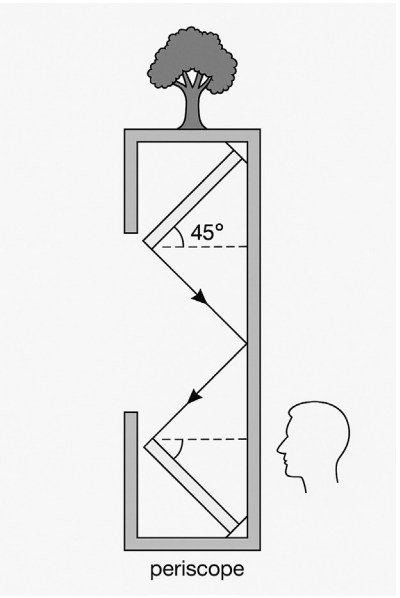
37. Magnetic field lines are shown in the given diagram for a current-carrying solenoid.
A student makes a statement that the magnetic field at point P (inside the solenoid) is stronger than at point Q (outside the solenoid).



(i) Explain with reason if the student's claim is correct.

(ii) Also redraw the diagram and mark the direction of magnetic field lines.

38. The diagram shows a simple periscope used in submarines. A periscope is an optical device that allows sailors to see objects above the water surface while remaining underwater. It consists of two plane mirrors fixed at 45° to the vertical, placed parallel to each other inside a tube. Light from an object on the surface strikes the upper mirror, reflects downward to the lower mirror, and then reflects again into the observer's eye. The principle of reflection of light is used here. This device is also applied in some tanks and other defense instruments for observation.



A. Which law of reflection is followed by the plane mirrors in the periscope?

B. State two uses of periscopes apart from submarines.

Attempt either subpart C or D.

C. An object is placed 2.0 m in front of the upper mirror of a periscope. Find the distance of the final image from the observer's eye inside the periscope, if the two mirrors are separated by 50 cm vertically.

OR

D. A ray of light strikes the upper mirror at an angle of incidence 45°. Draw the path of the ray through the periscope, marking all angles clearly. Also, state the final direction of the ray emerging towards the observer.

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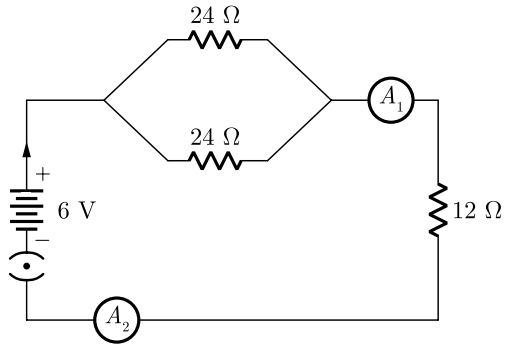
39. Attempt either option A or B

A. (i) 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 in series connected to a battery of V volts?

(ii) Study the following circuit and find out:

(a) Current in 12Ω resistor.

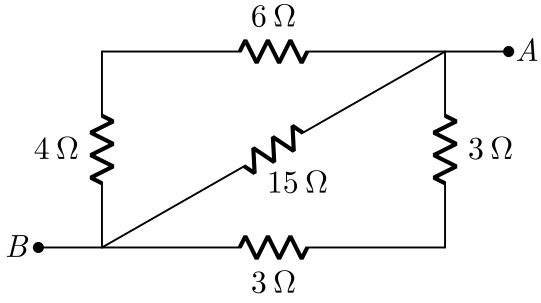
(b) Difference in the readings of A_1 and A_2, if any.



OR

B. (i) List two disadvantages of using a series circuit in homes.

(ii) Calculate the effective resistance between A and B in the circuit given below:



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