Sample Paper 04

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. Transpiration is the process of water movement through a plant and its evaporation from aerial parts. What is the most significant function of this process for the plant?
(a) To release excess energy absorbed from the sun.
(b) To create a suction force that pulls water up from the roots.
(c) To store water in the leaves for use during dry conditions.
(d) To provide water as a reactant for cellular respiration.

2. Plant hormones, or phytohormones, control various growth responses. Which hormone is responsible for the bending of a plant tendril when it comes in contact with a support?
(a) Gibberellin
(b) Cytokinin
(c) Abscisic acid
(d) Auxin

3. The exchange of materials between the mother and the developing foetus is crucial for a healthy pregnancy. This exchange occurs through which specialized tissue?
(a) Ovary
(b) Uterus
(c) Fallopian tube
(d) Placenta

4. A normal human somatic (body) cell contains 46 chromosomes. How many of these are classified as autosomes (non-sex chromosomes)?
(a) 46 (b) 44
(c) 23 (d) 2

5. The ozone layer is a region of Earth's stratosphere. What is its primary importance for the survival of life on Earth?
(a) It maintains the planet's temperature through the greenhouse effect.
(b) It absorbs most of the Sun's harmful ultraviolet (UV) radiation.
(c) It is the primary source of atmospheric oxygen needed for respiration.
(d) It creates the Earth's magnetic field, deflecting solar wind.

6. Consider the following statements about the human excretory system: (i) The kidneys are the main organs of excretion, filtering waste from the blood. (ii) The nephron is the structural and functional unit of the kidney. (iii) Urine is temporarily stored in the ureters before being passed out. (iv) The removal of nitrogenous wastes like urea from the body is called excretion.
Which of the above statements are correct?
(a) (i), (ii), and (iv)
(b) (ii) and (iii) only
(c) (i) and (iii) only
(d) All are correct.

7. The common bread mould, Rhizopus, spreads rapidly under moist and warm conditions. How does it primarily reproduce asexually?
(a) Through budding
(b) Through fragmentation
(c) Through vegetative propagation
(d) Through spore formation

8. **Assertion (A) :** The transmission of a nerve impulse across a synapse is a chemical process.
Reason (R) : When an impulse reaches an axon terminal, it triggers the release of neurotransmitters that diffuse across the synaptic gap.
(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 genetic makeup of the father's gamete determines the sex of a human child.
Reason (R): Human males have one X and one Y sex chromosome, while females have two X chromosomes.
(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. During hemodialysis, the dialysis fluid is continuously replaced with fresh fluid. Justify why this is a necessary step in the procedure for a patient with kidney failure.

11. Attempt either option A or B
A. List the three key events that occur during the process of photosynthesis in the chloroplasts of a leaf.

OR

B. State the primary function of platelets and plasma in human blood.

12. What would be the consequences for an ecosystem if all decomposers, such as bacteria and fungi, were to vanish? Provide two reasons.

13. Explain the phenomenon of phototropism in plants. Name the plant hormone responsible for this movement and describe its mechanism of action that causes a plant shoot to bend towards a light source.

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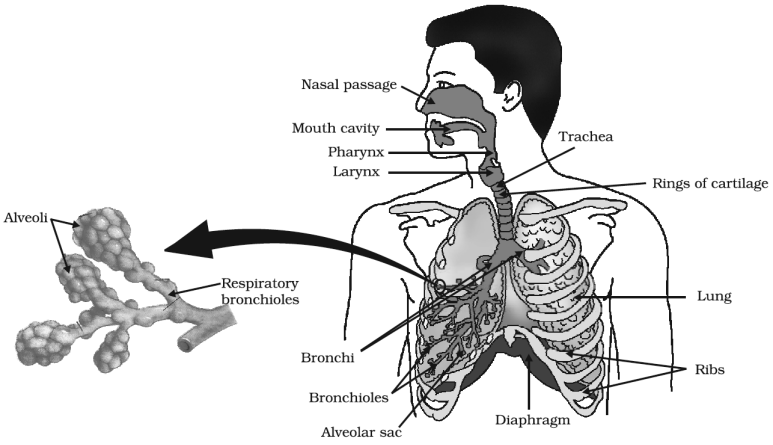
14. In a monohybrid cross, Mendel observed that crossing a pure-breeding tall pea plant with a pure-breeding dwarf pea plant resulted in all tall plants in the F1 generation.

(i) What principle of inheritance is demonstrated by the results of the F1 generation?

(ii) When the F1 plants were self-crossed, what was the phenotypic ratio of tall to dwarf plants observed in the F2 generation?

(iii) State the law that explains the reappearance of the dwarf trait in the F2 generation.

15. The diagram below shows the human respiratory system. the questions that follow.



A. Identify the balloon-like structures at the end of the bronchioles. Describe two features that make them ideal for efficient gaseous exchange.

OR

B. Explain the mechanism of inhalation, detailing the roles of the diaphragm and rib muscles.

C. Name the respiratory pigment in human blood. Explain its role in the transportation of oxygen.

16. Attempt either option A or B

A. (i) Differentiate between regeneration and fragmentation as modes of asexual reproduction.

(ii) Explain how Plasmodium reproduces asexually. Name this process.

(iii) List two reasons why offspring produced by asexual reproduction are often called clones.

OR

B. (i) Draw a labelled diagram of the human female reproductive system.

(ii) State the site of fertilization and the site of implantation of the embryo in the human female.

(iii) What is menopause?

SECTION-B

17. In the reaction :

$$MnO_2 + 4HCl \rightarrow MnCl_2 + Cl_2 + 2H_2O$$

Which statement is correct?

(a) MnO_2 is oxidized to $MnCl_2$.

(b) HCl is oxidized to Cl_2.

(c) MnO_2 is the reducing agent.

(d) HCl is the oxidizing agent.

18. Acetic acid (CH_3COOH) is classified as a weak acid because it:
(a) is an organic compound.
(b) is highly corrosive.
(c) has a very low pH.
(d) dissociates only partially in an aqueous solution.

19. A food manufacturer wants to store a new line of acidic fruit preserves. Which of the following metals would be the most unsuitable to use for making the storage containers?
(a) Tin
(b) Silver
(c) Zinc
(d) Copper

20. A student takes a strip of dry blue litmus paper and brings it near the mouth of a test tube releasing dry hydrogen chloride (HCl) gas. What will be the observed colour change?
(a) The litmus paper will turn red.
(b) The litmus paper will turn pink.
(c) The litmus paper will be bleached.
(d) There will be no change in colour.

21. Sodium acetate (CH_3COONa) is a salt. An aqueous solution of this salt will have a pH value:
(a) less than 7.
(b) exactly 7.
(c) more than 7.
(d) close to 0.

22. An aqueous solution of sodium sulphate is mixed with an aqueous solution of barium chloride in a test tube. The result is:
(a) A yellow precipitate is formed.
(b) A clear solution is formed.
(c) A white precipitate is formed.
(d) A colourless gas is evolved.

23. When a zinc strip is dipped into a blue solution of copper(II) sulphate, the solution turns colourless after some time. This reaction is an example of a:
(a) Combination reaction
(b) Double displacement reaction
(c) Decomposition reaction
(d) Displacement reaction

24. **Assertion (A) :** Diamond is used as an abrasive for cutting glass, while graphite is used as a lubricant.
Reason (R) : Diamond has a rigid three-dimensional tetrahedral structure, while graphite has a hexagonal layered structure where layers can slide over each other.
(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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25. Answer the following based on the reaction of metals with water:

(a) When a piece of calcium metal is dropped into a beaker of water, it starts floating on the surface after some time. Provide a scientific reason for this observation.

(b) Noble metals like gold, silver, and platinum do not react even with steam. What conclusion can be drawn about their position in the reactivity series?

26. Attempt either option A or B.

(A) The corrosion of iron, commonly known as rusting, is a major problem.

(i) Give the chemical name of rust.

(ii) State the two essential conditions required for the rusting of iron.

(iii) Explain how applying a coat of paint to an iron grill prevents it from rusting.

OR

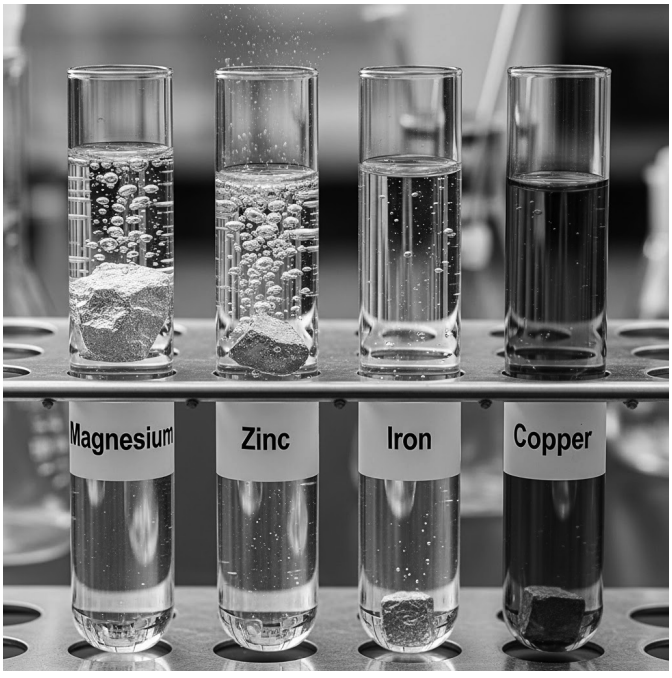
(B) Corrosion affects different metals in different ways, leading to the formation of various compounds on their surfaces.

(i) When silver articles are exposed to air, they gradually turn black. Name the black substance formed.

(ii) A copper vessel develops a green coating on its surface over time. What is the chemical composition of this green layer?

(iii) Explain why aluminium is considered a corrosion-resistant metal despite being highly reactive.

27. A student takes four test tubes containing equal volumes of dilute hydrochloric acid and adds pieces of Magnesium, Zinc, Iron, and Copper to each, respectively.

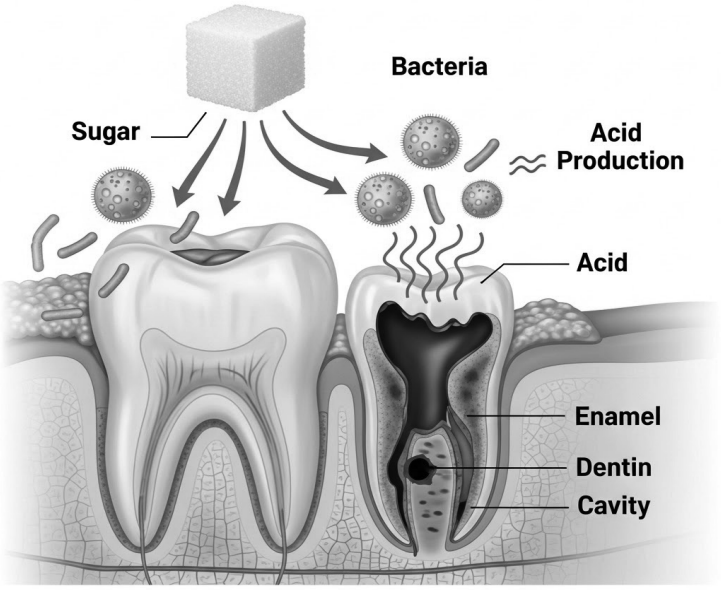


(a) In which test tube would the rate of effervescence (bubble formation) be the highest? Give a reason for your answer.

(b) Based on the expected rate of reaction, arrange the four metals in decreasing order of reactivity.

(c) What would you expect to observe in the test tube containing the piece of copper? Justify your observation.

28. Tooth enamel, the hardest substance in the human body, is made of calcium phosphate. It does not dissolve in water but is corroded when the pH in the mouth is below 5.5. Bacteria present in the mouth produce acids by the degradation of sugar and food particles.



(a) What is the chemical nature of the substance responsible for tooth decay?
(b) Explain why tooth enamel, which is a salt, begins to corrode in an acidic medium.
(c) How does the regular use of a good quality toothpaste help in preventing this decay?

OR

A student is given three aqueous solutions labelled P, Q, and R. Upon testing with a universal indicator paper, the pH values are found to be 1, 7, and 13, respectively.
(a) Identify the solution that is (i) strongly acidic, (ii) neutral, and (iii) strongly alkaline.
(b) Arrange the three solutions in increasing order of their hydrogen ion (H^+) concentration.
(c) What colour would the universal indicator show in each of the three solutions?

29. Attempt either option A or B.

(A) Ethanol and Ethanoic acid are two commercially important organic compounds. While both are soluble in water, their chemical properties differ significantly.
  (a) Describe a chemical test involving a reaction with a metal carbonate to distinguish between ethanol and ethanoic acid. State the expected observations.
  (b) Write the balanced chemical equation for the reaction occurring in the test described in part (a).
  (c) What is observed when a few drops of alkaline $KMnO_4$ solution are added to warm ethanol in a test tube? Name this type of reaction.
  (d) What happens when ethanol is heated with excess concentrated sulphuric acid at 443 K? Name the major product formed.
  (e) What is the role of concentrated sulphuric acid in the reaction mentioned in part (d)?

OR

(B) The process of making soap from fats or oils is known as sanctification.
  (a) Define saponification.
  (b) Name the two primary raw materials needed to prepare soap in a school laboratory.

(c) Explain the purpose of adding common salt (NaCl) to the reaction mixture after the soap is formed. What is this process called?
(d) Besides soap, what is the other important by-product formed during this process?
(e) How would you confirm that the resulting soap solution is alkaline in nature?

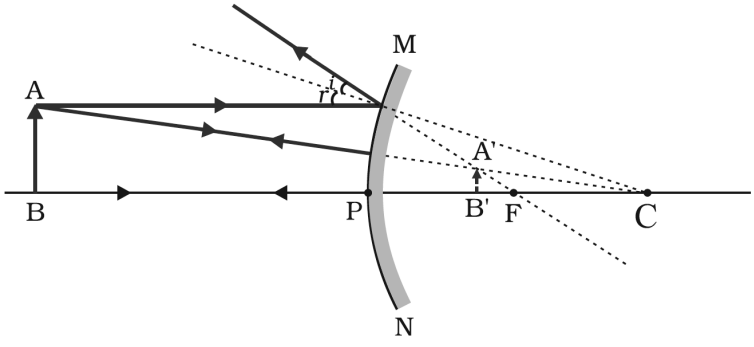
SECTION-C

30. While studying the laws of reflection, a student writes down the following statements:
I. The incident ray, the reflected ray, and the normal all lie in the same plane.
II. The angle of incidence is always equal to the angle of reflection.
III. The laws of reflection are not applicable to spherical mirrors.
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. A person standing in a room sees a sharp image of a window on a wall. What optical phenomenon is responsible for this?
(a) Refraction of light
(b) Diffraction of light
(c) Pin-hole camera effect
(d) Reflection from the window

32. **Assertion (A) :** The sun appears reddish at sunrise and sunset.
Reason (R) : At sunrise and sunset, light from the sun travels a longer path through the atmosphere, and the longer wavelength red light scatters less.
(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.

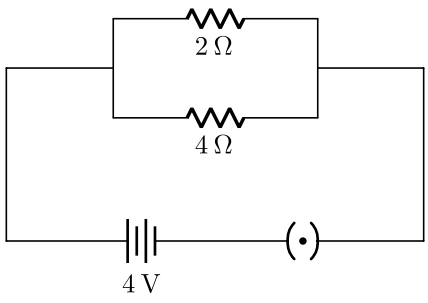
33. A spherical mirror has a radius of curvature of 20 cm which is below in the diagram



A. Find its focal length.
B. Identify the type of mirror that always forms diminished, erect, and virtual images.
C. State one use of this mirror.

34. Attempt either option A or B

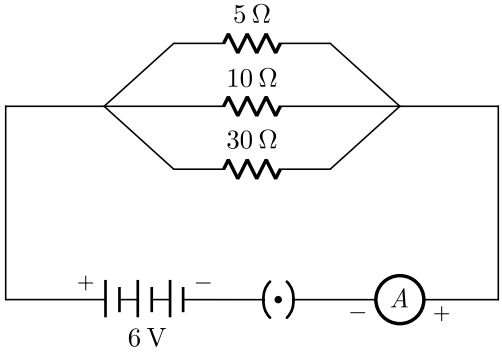
A.



1. Find out the equivalent resistance of the circuit
2. Whai the current flow through this combination ?

OR

B.



In the above circuit diagram calculate :

(a) the value of current through each resistor.

(b) the total current in the circuit.

35. A person can read the number plate of a distant bus clearly but he finds difficulty in reading a book. What type of defect of vision he is suffering from? Name the type of lens he needs to correct this defect. Write the causes of this defect.

36. An electric heater connected to a 220 V line has two resistance coils of 22 Ohms each.
Calculate the current if these coils are used

(a) Separately

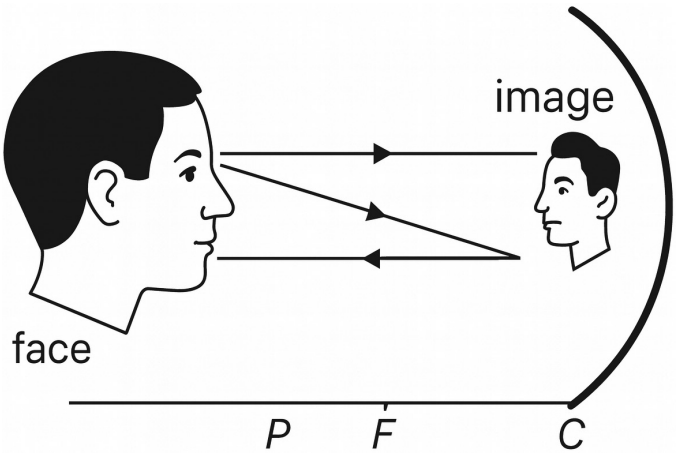
(b) In series

(c) In parallel.

37. Draw a figure of current carrying solenoid and show magnetic field lines inside and outside it. Compare the pattern of the field with the magnetic field around a bar magnet.

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38. A concave mirror is often used by barbers and in shaving mirrors to obtain an enlarged image of the face. When the face is held close to the mirror, the reflected rays converge to form a magnified, erect image. However, if the face is moved far away, the mirror no longer produces an erect enlarged image but instead gives a diminished inverted one. This practical application shows how the nature of the image depends on the distance of the object from the pole of the mirror. The diagram represents the situation when the object is placed between the pole and the focus of the mirror.



A. Which type of mirror is used as a shaving mirror and why?

B. What kind of image (real or virtual, erect or inverted, magnified or diminished) is seen when the face is kept very close to the mirror?
Attempt either subpart C or D.

C. A concave mirror has focal length 15 cm. If the face is placed 10 cm from the mirror, calculate the image distance.

OR

D. For the above situation, calculate the magnification and state the size of the image compared to the object.

39. Attempt either option A or B

A. What is meant by magnetic force ? Name and explain the rule to determine the direction of force experienced by a current carrying conductor in a magnetic field. How does this force gets affected on :
(i) doubling the magnitude of current.
(ii) reversing the direction of current flow and
(iii) reversing the direction of magnetic field?

OR

B. Two electric lamps rated 100 W, 220 V and 25 W, 220 V are connected in parallel. Calculate the total electric current in the circuit.

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