Sample Paper 05

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. Stomata, the tiny pores on the surface of leaves, are crucial for a plant's survival. What is the specific function of the guard cells that surround each stoma?
(a) To manufacture chlorophyll for photosynthesis.
(b) To regulate the opening and closing of the stomatal pore.
(c) To absorb water directly from the atmosphere.
(d) To provide physical strength to the leaf structure.

2. The human nervous system is a complex network responsible for coordination and control. It is primarily divided into which two major parts?
(a) The Sensory System and the Motor System
(b) The Brain and the Spinal Cord
(c) The Central Nervous System (CNS) and the Peripheral Nervous System (PNS)
(d) The Voluntary System and the Involuntary System

3. The human female menstrual cycle is a series of natural changes that occurs approximately every 28 days. What is the term for the event where a mature egg is released from the ovary?
(a) Menstruation (b) Fertilization
(c) Implantation (d) Ovulation

4. Fossils provide a window into the past. What is the primary way in which the fossil record supports the theory of evolution?
(a) It proves that all organisms from the past are identical to modern organisms.
(b) It shows a chronological sequence of how life forms have changed and diversified over time.
(c) It demonstrates that all species appeared on Earth at the exact same time.
(d) It contains the complete genetic information of all extinct species.

5. In a simple aquatic food chain where algae are eaten by small fish, which are then eaten by a large bird, which organism occupies the trophic level of a producer?
(a) Algae (b) Small fish
(c) Large bird (d) Water

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6. Consider the following statements about reproduction in flowering plants:
(i) Pollination is the process of transferring pollen from an anther to a stigma.
(ii) Cross-pollination involves the transfer of pollen between flowers of two different plants.
(iii) Fertilization is the fusion of a male gamete with a female gamete.
(iv) After fertilization, the ovule develops into the fruit.
Which of the above statements are correct?
(a) (i), (ii), and (iii) (b) (ii) and (iv) only
(c) (i) and (iv) only (d) All are correct.

7. The circulatory system contains different types of blood vessels. Which of the following is a correct distinction between arteries and veins?
(a) Arteries always carry deoxygenated blood, while veins always carry oxygenated blood.
(b) Arteries have thin, non-elastic walls, while veins have thick, elastic walls.
(c) Arteries carry blood away from the heart, while veins carry blood towards the heart.
(d) Arteries are wide-lumened and have valves, while veins are narrow-lumened and do not.

8. **Assertion (A) :** In a pea plant heterozygous for height (Tt), the plant appears tall.
Reason (R) : An allele is called dominant if it expresses its trait even in the presence of an alternative allele.
(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 length and complexity of food chains in an ecosystem are generally limited.
Reason (R) : According to the 10% law, only about 10% of the energy is transferred from one trophic level to the next.
(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. The stomach produces highly corrosive hydrochloric acid, yet its own wall is not digested. Give a biological reason for this.

11. Student to attempt either option A or B.
A. What is meant by 'double circulation' in the human heart? State one reason why it is a more efficient system of circulation.

OR

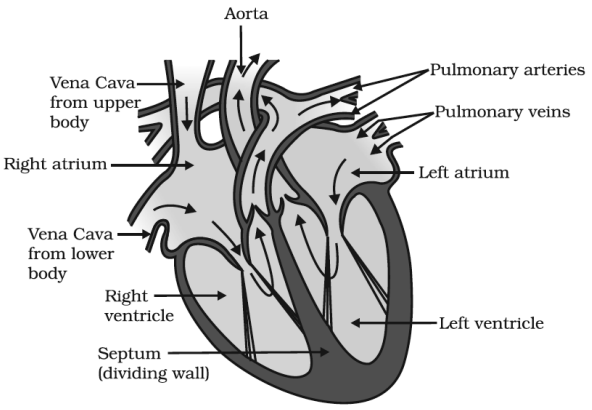
B. Explain the mechanism by which guard cells regulate the opening and closing of stomatal pores.

12. In a food chain consisting of Grass → Deer → Lion, 20,000 J of energy was available to the grass. How much energy would be available to the deer? State the law that governs the transfer of energy in a food chain.

13. What is geotropism? Draw a neat, labelled diagram of a potted plant placed horizontally to illustrate the response of its shoot and root to gravity.

14. Differentiate between inherited traits and acquired traits by giving two key differences. State which of the two can be passed on to the next generation and why.

15. Observe the given sectional view of the human heart and the questions that follow.



A. What is the function of the muscular wall called the septum that divides the heart?

OR

B. What is the role of valves in the heart? What would happen if they did not function correctly?

C. Trace the path of oxygenated blood starting from the lungs and ending at the body tissues.

16. Attempt either sub part A or B

A. (i) Define vegetative propagation and list two natural methods of this type of reproduction in plants.
(ii) State two advantages of using vegetative propagation for growing certain types of plants.
(iii) Can plants like rose and jasmine grown by this method produce fruits and seeds? Give a reason.

OR

B. (i) Draw a neat labelled diagram of the human male reproductive system.
(ii) What is the composition of semen?
(iii) State the function of the vas deferens.

SECTION-B

17. For the reaction of iron with steam, what are the correct values for the stoichiometric coefficients 'p' and 'q'?
Equation :

$$p\mathrm{Fe(s)} + q\mathrm{H_2O(g)} \xrightarrow{\text{Heat}} \mathrm{Fe_3O_4(s)} + 4\mathrm{H_2(g)}$$

(a) p = 1, q = 4
(b) p = 3, q = 1
(c) p = 3, q = 4
(d) p = 2, q = 4

18. Some hydrated salts, like washing soda ($Na_2CO_3 \cdot 10H_2O$), lose their water of crystallisation when exposed to open air. This property is known as:
(a) Deliquescence
(b) Efflorescence
(c) Corrosion
(d) Hydration

19. Which of the following non-metals is known to be lustrous, a property typically characteristic of metals?
(a) Sulphur
(b) Phosphorus
(c) Bromine
(d) Iodine

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20. A farmer finds her soil to be too acidic (low pH). She decides to treat the soil with slaked lime ($Ca(OH)_2$). What will be the effect of this action on the soil's pH?
(a) The pH will decrease further.
(b) The pH will remain unchanged.
(c) The pH will increase.
(d) The soil will become water-logged.

21. An aqueous solution of ammonium chloride (NH_4Cl) is tested with litmus paper. The expected observation is that:
(a) Blue litmus turns red.
(b) Red litmus turns blue.
(c) There is no change in either litmus paper.
(d) Both litmus papers are bleached.

22. When an active metal like zinc reacts with a dilute strong acid like HCl, the gas produced is:
(a) Carbon dioxide
(b) Oxygen
(c) Chlorine
(d) Hydrogen

23. When dilute hydrochloric acid is added to a sodium sulphide solution, a gas with the smell of rotten eggs is evolved. This reaction is an example of:
(a) Combination
(b) Decomposition
(c) Displacement
(d) Double displacement

24. **Assertion (A) :** An aqueous solution of ethene (C_2H_4) will decolorize bromine water.
Reason (R) : Ethene is an unsaturated hydrocarbon and readily undergoes an addition reaction with bromine.
(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 states of elements:
(a) Name the only metal that is known to exist as a liquid at standard room temperature (25°C).
(b) Name the only non-metal that is known to exist as a liquid at standard room temperature (25°C).

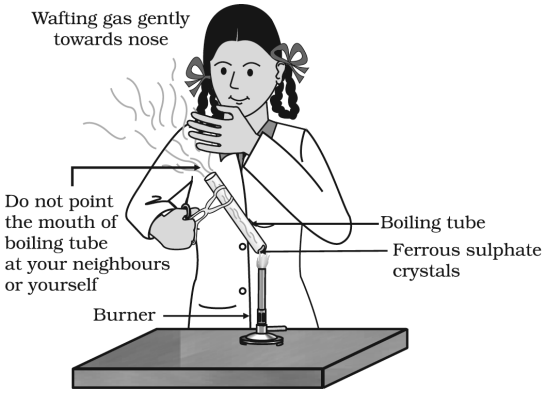
26. Attempt either option A or B.
(A) The method used to extract a metal from its ore is primarily determined by its position in the reactivity series.
(i) Describe the general process used to extract metals of low reactivity (e.g., Mercury) from their sulphide ores.
(ii) Which single process is employed to extract highly reactive metals like Sodium, Calcium, and Aluminium?
(iii) Name the chemical substance most commonly used as a reducing agent for extracting moderately reactive metals like Zinc and Iron.

OR

(B) Electrolytic refining is a widely used method for obtaining metals of very high purity. Consider the electrolytic refining of copper.
(i) What materials are chosen for the anode and the cathode in this process?
(ii) Name a suitable electrolyte that should be used.
(iii) During the process, impurities settle down below the anode. What is this layer of impurities called?

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27. In a laboratory activity, a student takes a small amount of green-coloured ferrous sulphate heptahydrate ($FeSO_4 \cdot 7H_2O$) crystals in a dry boiling tube and heats it over a flame.



(a) What is the first observable change in the colour of the crystals? What does this change indicate?

(b) Upon stronger heating, which two gases are evolved? Describe the characteristic smell of one of these gases.

(c) What is the colour and chemical name of the solid compound left behind in the boiling tube after strong heating?

28. Industrial pollution releases gases like sulphur dioxide and nitrogen dioxide. These dissolve in atmospheric water droplets to form acid rain, which has harmful effects on the environment, including historical monuments like the Taj Mahal, which is made of marble.

(a) Name the two main acids present in acid rain.

(b) What is the chemical name of marble? Explain with a reason why it is susceptible to damage from acid rain.

(c) Briefly explain how acid rain can harm aquatic ecosystems.

OR

A farmer finds that due to continuous use of certain fertilizers, the soil in his field has become basic (pH 8.5), which is unsuitable for the crop he wants to grow.

(a) To improve the soil quality, should he add a substance that is acidic or basic in nature?

(b) Suggest a common organic substance that can be added to the soil to remedy this situation. Explain how it works.

(c) Why is it important for farmers to maintain the soil at an optimal pH?

29. Attempt either option A or B.

(A) Alkanes, Alkenes, and Alkynes are the three main classes of aliphatic hydrocarbons.

(a) What is meant by a homologous series? List any two characteristics of the members of such a series.

(b) Write the general formula for alkanes and alkynes.

(c) To which homologous series does the hydrocarbon with the formula C_4H_8 belong? Draw the structure of one of its isomers.

(d) Explain why alkanes generally burn with a clean flame while alkenes and alkynes burn with a sooty flame.

OR

(B) Ethanol (C_2H_5OH) is a very useful industrial chemical.

(a) What is denatured alcohol, and what is its main purpose?

(b) Write the balanced chemical equation for the reaction between ethanol and sodium metal.

(c) Ethanol is sometimes used as an additive in petrol. What is this mixture of petrol and ethanol called?

(d) Describe the chemical principle behind the breathalyzer test used by police to detect drunk driving, which involves the conversion of ethanol to ethanoic acid.
(e) Draw the electron dot structure for the ethanol molecule.

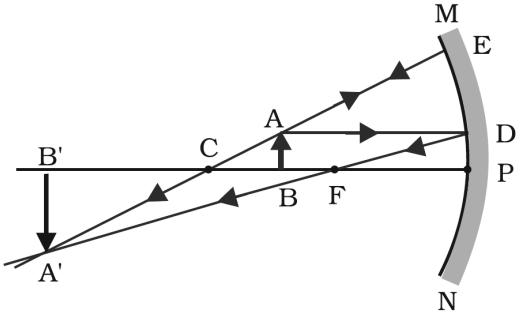
SECTION-C

30. A student makes the following statements about the power of a lens:
I. The power of a lens is a measure of its degree of convergence or divergence.
II. A lens with a short focal length has a low power.
III. The S.I. unit of power of a lens is the dioptre (D).
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 ray of light strikes a plane mirror at an angle of 30° with the normal. What is the angle between the reflected ray and the plane mirror?
(a) 30° (b) 60°
(c) 90° (d) 120°

32. **Assertion (A) :** A person with hypermetropia cannot see nearby objects clearly.
Reason (R) : The eyeball is too long and the focal length of the eye lens is too short.
(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. An object is placed at 27 cm in front of a concave mirror as shown in the figure of focal length 18 cm.

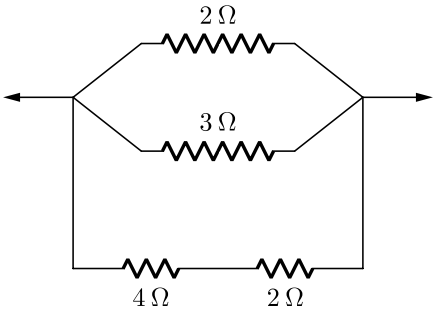


A. Find the position of the image using the mirror formula.
B. Calculate the magnification produced.
C. State the nature of the image.

34. Attempt either option A or B
A. Two resistors of resistances 3 Ω and 6 Ω 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.

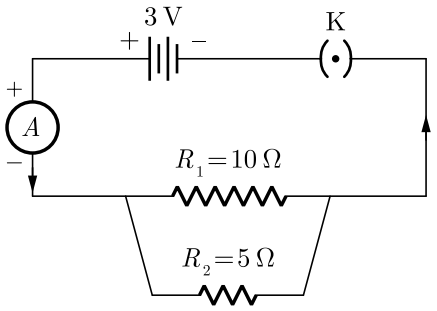
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B. Calculate the equivalent resistance from the following combination of resistors.

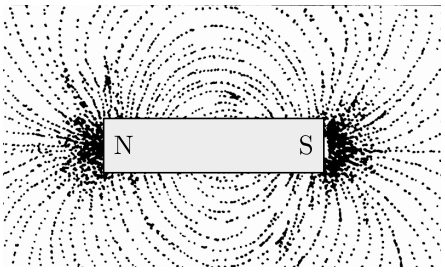


35. (a) State two main causes of developing far-sightedness.
(b) How can this defect of vision be corrected ?

36. Study the following circuit and answer the following questions :
(a) State the type of combination of the two resistors in the circuit.
(b) How much current is flowing through :
(i) 10 Ω and through,
(ii) 15 Ω resistors.
(c) What is the ammeter reading ?



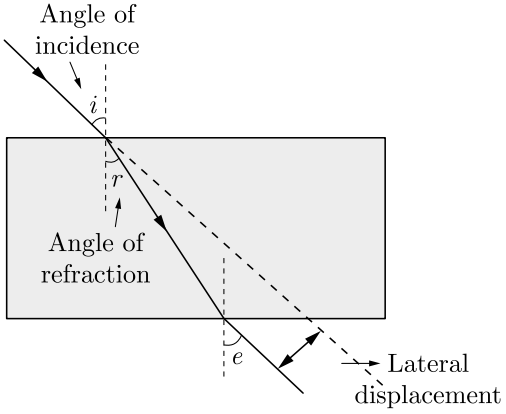
37. Study the diagram given below and answer the questions that follow :



(a) Why do the iron filings arrange in such a pattern?
(b) What does this pattern demonstrate ?
(c) Why do the iron filings near the bar magnet seem to align in the shape of closed curves ?

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38. A glass slab is a rectangular block of glass with parallel opposite faces. When a ray of light enters the slab from air, it bends towards the normal because it passes from a rarer medium to a denser medium. On emerging from the slab back into air, the ray bends away from the normal. Although the incident ray and the emergent ray are parallel to each other, they are shifted sideways by a certain distance called lateral displacement. This phenomenon is a simple demonstration of refraction of light through a transparent medium with parallel boundaries.



A. What causes the bending of light when it enters from air to glass?

B. State the relationship between the incident ray and the emergent ray in a glass slab.

Attempt either subpart C or D.

C. A ray of light enters a glass slab at an angle of incidence of 30° and is refracted at 20°. Using Snell's law, calculate the refractive index of glass with respect to air.

OR

D. Explain why the emergent ray is parallel to the incident ray but not in the same straight line.

39. Attempt either option A or B

A. (i) Suppose your parents have constructed a two room house and you want that in the living room there should be a provision of one electric bulb, one electric fan, a refrigerator and a plug point for appliances of power up to 2 kW. Draw a circuit diagram showing electric fuse and earthing as safety devices.

(ii) The given magnet is divided into three parts A, B and C.

A	B	C

Name the parts where the strength of magnetic field is:

(a) maximum

(b) minimum

How will the density of magnetic field lines differ at these parts?

OR

B. (i) What is the meaning of electric power of an electrical device? Write its S.I. unit.

(ii) An electric kettle of 2 kW is used for 2h. Calculate the energy consumed in (a) kilowatt hour and (b) joules.

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