Sample Paper 10

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. The inner lining of the small intestine is covered with millions of finger-like projections called villi. What is their primary function?
(a) To secrete mucus to lubricate the food.
(b) To vastly increase the surface area for efficient absorption of digested food.
(c) To push the food forward through the process of peristalsis.
(d) To produce hydrochloric acid to kill bacteria.

2. Plants exhibit various tropic movements in response to external stimuli. The growth of plant roots towards a source of water is known as:
(a) Geotropism
(b) Phototropism
(c) Hydrotropism
(d) Thigmotropism

3. The filamentous alga Spirogyra reproduces asexually when its filament breaks into smaller pieces, each of which grows into a new individual. What is this method of reproduction called?
(a) Budding
(b) Fragmentation
(c) Spore formation
(d) Fission

4. Gregor Mendel's experiments on pea plants laid the foundation for modern genetics. What was a key reason for his choice of pea plants for his study?
(a) They were difficult to grow, which made the experiment more challenging.
(b) They had a very long life cycle, allowing for long-term observation.
(c) They possessed several pairs of easily identifiable, contrasting characteristics.
(d) They could not be self-pollinated, ensuring genetic diversity.

5. What is the primary ecological role of decomposers, such as bacteria and fungi, in an ecosystem?
(a) To serve as the primary source of energy for the food web.
(b) To control the population of producers by eating them.
(c) To fix atmospheric nitrogen for plants to use.
(d) To break down dead organic matter and recycle essential nutrients.

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6. Consider the following statements about gaseous exchange in plants:
(i) During the day, plants take in carbon dioxide for photosynthesis.
(ii) Oxygen is released as a major waste product of photosynthesis.
(iii) At night, with no photosynthesis occurring, plants only respire, releasing carbon dioxide.
(iv) The rate of photosynthesis during the day is typically much greater than the rate of respiration.
Which of the above statements are correct?
(a) (i) and (iv) only
(b) (ii) and (iii) only
(c) (i), (ii), and (iii) only
(d) All are correct.

7. A simple reflex action, such as withdrawing your hand from a hot object, involves a pathway known as the reflex arc. Which of the following is generally NOT involved in such a simple reflex arc?
(a) Receptor organ
(b) Sensory neuron
(c) Brain
(d) Effector organ

8. **Assertion (A) :** The wing of a bat and the forelimb of a human are considered homologous organs.
Reason (R) : They share a similar basic anatomical structure and embryonic origin but have been adapted to perform different functions.
(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 placenta facilitates the supply of nutrients and oxygen to the developing embryo.
Reason (R) : The placenta is a temporary organ that connects the foetus to the uterine wall of the mother.
(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. Herbaceous plants do not have a well-developed respiratory system like animals, but they still get enough oxygen. Provide two reasons to justify this.

11. Students to attempt either option A or B
A. What is blood pressure? Name the instrument used to measure it and state the normal systolic and diastolic pressure in a healthy adult.

OR

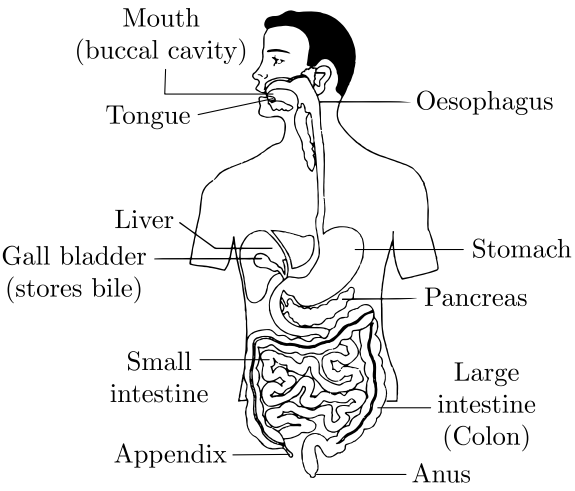
B. How is the amount of urine produced by the kidneys regulated?

12. The use of disposable kulhads (earthen cups) is considered a better alternative to plastic cups for serving tea in trains. Justify this statement by giving two reasons.

13. Name the plant hormone responsible for the following functions:
(i) Growth of the stem and cell enlargement.
(ii) Wilting of leaves and dormancy of buds.
(iii) Ripening of fruit.

14. (i) State Mendel's Law of Independent Assortment.
(ii) In a dihybrid cross, what is the phenotypic ratio of offspring obtained in the F2 generation?
(iii) What does this ratio indicate about the inheritance of the two traits?

15. Refer to the given diagram of the human alimentary canal and the questions.



Human alimentary canal.

A. Name the glands whose secretions are poured into the part labelled 'O' (Small Intestine).

OR

B. What are enzymes? Give one example of an enzyme that digests proteins and one that digests starch.
C. Describe the role of the part labelled 'P' (Large Intestine).

16. A. (i) Differentiate between unisexual and bisexual flowers with one example of each.
(ii) What would be the fate of the following parts of a flower after fertilization: ovule, ovary, and petals?
(iii) Why is cross-pollination often considered advantageous for a species?

OR

B. (i) What is meant by contraception? List two reasons why it is important.
(ii) Name one surgical method of contraception for males and one for females. How do these methods work?
(iii) State one advantage of using barrier methods like condoms.

SECTION-B

17. The decomposition of hydrogen peroxide into water and oxygen ($2H_2O_2 \rightarrow 2H_2O + O_2$) is a special type of redox reaction where the same element is both oxidized and reduced. This type of reaction is known as:
(a) A combination reaction
(b) A displacement reaction
(c) A disproportionation reaction
(d) A neutralization reaction

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18. Toothpastes are formulated to help prevent tooth decay caused by acids produced by bacteria in the mouth. Therefore, the chemical nature of toothpaste is generally:
(a) Acidic
(b) Neutral
(c) Basic
(d) Corrosive

19. Which of the following non-metals is a good conductor of heat?
(a) Sulphur
(b) Diamond
(c) Graphite
(d) Phosphorus

20. A student passes dry ammonia gas (NH_3) over a strip of dry blue litmus paper. What will be the observed colour change?
(a) The blue litmus turns red.
(b) The blue litmus turns colourless.
(c) The blue litmus turns green.
(d) There will be no change in colour.

21. Ammonium acetate (CH_3COONH_4) is a salt formed from a weak acid (acetic acid) and a weak base (ammonium hydroxide). Its aqueous solution is likely to be:
(a) Strongly acidic
(b) Strongly basic
(c) Approximately neutral
(d) Amphoteric

22. The reaction $2Mg(s) + O_2(g) \rightarrow 2MgO(s)$ can be classified as:
(a) A combination reaction only
(b) A redox reaction only
(c) Both a combination and a redox reaction
(d) A decomposition reaction

23. The silver coating on a traditional mirror is formed when a solution containing a silver salt is treated with a reducing agent like glucose. The formation of the silver layer is an example of a:
(a) Neutralization reaction
(b) Precipitation reaction
(c) Reduction reaction
(d) Decomposition reaction

24. **Assertion (A) :** Ethanoic acid reacts with sodium carbonate to produce carbon dioxide gas with brisk effervescence.
Reason (R) : All organic compounds that contain a carboxyl functional group (–COOH) are acidic in nature.
(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.

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25. Name the metals which are known to be the most malleable and the most ductile.

26. Attempt either option A or B.

(A) Highly reactive metals like sodium are high up in the reactivity series. Explain why sodium cannot be obtained from its molten oxide (Na_2O) by reduction using carbon.

OR

(B) Draw a neat, labelled diagram of the laboratory setup used to show that an acid solution in water conducts electricity. Your diagram must include a beaker, two electrodes, a bulb, a switch, and a battery.

27. A student performs an experiment where she places a clean iron nail into a test tube containing a blue copper sulphate solution. She places another clean copper wire into a test tube containing a pale green ferrous sulphate solution.

(a) Describe the observation in the first test tube (iron nail in copper sulphate).

(b) Describe the observation in the second test tube (copper wire in ferrous sulphate).

(c) Based on these observations, what conclusion can be drawn about the relative reactivities of iron and copper?

28. A person walking through a forest accidentally touches a nettle plant. The stinging hairs of the nettle leaf inject methanoic acid into the skin, causing a burning pain. Traditionally, relief is found by rubbing the area with the leaf of a dock plant, which often grows nearby.

(a) What is the chemical nature of the substance injected by the nettle sting?

(b) The dock plant leaf provides relief because its sap is basic. What is the chemical name for the reaction that occurs between the nettle sting and the dock leaf sap?

(c) If a dock plant is not available, suggest a common household chemical that could be applied to get similar relief.

(d) Why would applying vinegar to the nettle sting be a bad idea?

OR

Two acidic solutions, Solution A and Solution B, have pH values of 2 and 5, respectively.

(a) Which solution is more acidic?

(b) Which solution will have a higher concentration of H^+ ions?

(c) The concentration of H^+ ions in the more acidic solution is how many times greater than that in the less acidic solution?

(d) What colour would you expect a universal indicator to show in Solution A?

29. Attempt either option A or B.

(A) Butene (C_4H_8) is an alkene. It can exist in the form of several structural isomers.

(a) To which homologous series does butene belong? What is the general formula for this series?

(b) Draw the structures of three structural isomers of butene (C_4H_8).

(c) Provide the IUPAC name for each of the three isomers you have drawn.

(d) How would you convert But-1-ene to Butane? Write the relevant chemical equation.

OR

(B) The chemical properties of ethanoic acid (CH_3COOH) are characteristic of carboxylic acids.

(a) Write the balanced chemical equation for the reaction of ethanoic acid with an alcohol like ethanol in the presence of an acid catalyst. Name this reaction.

(b) Write the balanced chemical equation for the reaction of ethanoic acid with a base like sodium hydroxide. Name this reaction.

(c) Write the balanced chemical equation for the reaction of ethanoic acid with a metal carbonate like sodium carbonate.

(d) Draw the electron dot structure for the ethanoic acid molecule.

SECTION-C

30. A student makes the following statements about image formation by a concave lens:

I. A concave lens always forms a virtual and erect image.

II. The image formed by a concave lens is always diminished.

III. The focal length of a concave lens is considered positive.

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. Which of the following is an example of total internal reflection?

(a) The glittering of a diamond

(b) The blue color of the sky

(c) The formation of a shadow

(d) The functioning of a magnifying glass

32. **Assertion (A) :** A convex mirror is used as a rear-view mirror in vehicles.
Reason (R) : A convex mirror gives a wider field of view and forms a diminished, erect 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.

33. An object 5 cm in length is placed 25 cm away from a convex lens of focal length 10 cm.

A. Use the lens formula to calculate the image distance.

B. Find the size of the image using magnification.

C. State the nature of the image.

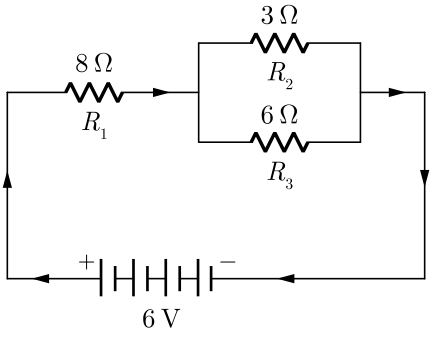
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34. Attempt either option A or B

A. In the following circuit diagram, find :

(a) the total resistance of the circuit.

(b) the total current flowing in the circuit.

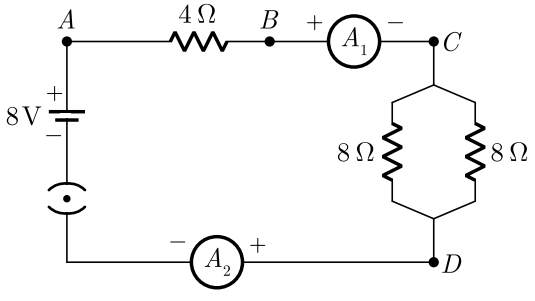


OR

B. Find out the following in the electric circuit given in figure :

(a) Effective resistance of two 8 Ω resistors in the combination.

(b) Current flowing through 4 Ω resistor.



35. Due to gradual weakening of ciliary muscles and diminishing flexibility of the eye lens a certain defect of vision arises. Write the name of this defect. Name the type of lens required by such persons to improve the vision. Explain the structure and function of such a lens.

36. Two resistors with resistances 10 Ω and 15 Ω are to be connected to emf 12 V so as to obtain :

(i) Minimum current

(ii) Maximum current.

How will you connect the resistance in each case ?

Calculate the strength of the total current in the circuit in the two cases.

37. Answer the following questions :

(i) What is the direction of magnetic field lines outside a bar-magnet ?

(ii) What is the SI unit of magnetic field ?

(iii) What does crowding of magnetic field lines indicate ?

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38. A concave mirror forms image of an object thrice in its size on a screen. Magnification of a mirror gives information about the size of the image relative to the object. It is defined as the ratio of size of image to the size of object. It is represented by m.

$$m = \frac{\text{Size of image}}{\text{Size of object}}$$

Sign of magnification by mirror gives the information about the nature of the image produce by it.

(i) Describe the nature of image formed.

(ii) If the object x distance from the pole of mirror, then find image distance from the pole.
Attempt either subpart C or D.

(iii) If the radius of curvature of mirror is R, then write the relation between object distance, image distance and focal length of the mirror.

OR

(iv) Give one use of concave mirror.

39. Attempt either option A or B

A. What are magnetic field lines? How is the direction of a magnetic field at a point determined ?
Draw the magnetic field lines (including field directions) of the magnetic field due to a circular coil of current. Name any two factors on which the magnitude of the magnetic field due to this coil depends.

B. (a) In a given ammeter, a student saw that needle indicates 12th division in ammeter while performing an experiment to verify Ohm's law. If ammeter has 10 divisions between 0 to 0.5 A, then what is the ammeter reading corresponding to 12th division ?

(b) How do you connect an ammeter and a voltmeter in an electric circuit ?

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