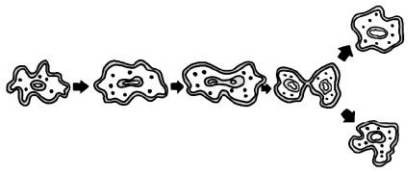
GENERAL INSTRUCTIONS :

Read the following instructions carefully and follow them:

(i) This question paper contains 39 questions. All questions are compulsory.
(ii) Question paper is divided into THREE sections –(A), (B) and (C).
Section (A): Biology (30 Marks)
Section (B): Chemistry (25 Marks)
Section (C): Physics (25 Marks)
(iii) The question paper has MCQs, VSAs, SAs, LAs and C/S-BQs. Marks are given against each question.
(iv) There are case based questions (CBQs) with three sub-questions and are of 4 marks each.
(v) Divide your answer sheet into three sections as per question paper - Section (A) (Biology), Section (B) (Chemistry) and Section (C) (Physics). It is compulsory to answer each question in its respective section. Do not mix answers of one section into the other section.
(vi) Instructions are given with each section and question, wherever necessary.
(vii) Kindly note that a separate question paper has been provided for visually impaired candidates.
(viii) There is no overall choice in the question paper. However, an internal choice has been provided in few questions. Only one of the choices in such questions must be attempted.

SECTION-A

1. **Which structure in a leaf is mainly responsible for gaseous exchange ?**
   (a) Xylem (b) Stomata
   (c) Phloem (d) Cuticle
2. **Identify the type of reproduction shown in the diagram given below :**



   (a) Budding (b) Fragmentation
   (c) Spore Formation (d) Binary Fission
3. **Identify the correct statement for spirogyra, leishmania and hydra :**
   (a) they reproduce sexually.
   (b) they are unicellular.
   (c) they are multicellular.
   (d) they reproduce asexually.
4. **Human brain has various parts or regions that help in different actions, responses and coordination. From the following, identify the part responsible for precision of voluntary actions :**
   (a) Cerebrum (b) Cerebellum
   (c) Medulla (d) Pons
5. **Pancreas secretes pancreatic juice which contain certain enzyme that helps in digestion of food. Choose the correct option from the following :**
   (a) Trypsin digests emulsified fats and lipase digests proteins.
   (b) Trypsin digests proteins and lipase digests emulsified fats.
   (c) Trypsin and lipase both digests fats.
   (d) Trypsin digests proteins and lipase digests carbohydrates.
6. **Sex is determined by different factors in various species. However, in human beings, it is determined genetically.**
   Which amongst the following option(s) is/are correct for human beings ?
   (i) Gamete carrying X chromosome from female parent.
   (ii) Gamete carrying X chromosome from male parent.
   (iii) Gamete carrying Y chromosome from male parent.
   (a) (ii) and (iii) (b) (i) only
   (c) (i) and (iii) (d) (iii) only

7. **Which of the following group is not 'biodegradable' ?**
   (a) Vegetable peels, dead leaves, paper
   (b) Cow dung, leather bag, water
   (c) Polythene bag, rubber band, ball pen
   (d) Paper, fruits, bones

   Directions : Question numbers (8) and (9) are Assertion and Reason based questions. Two statements are given, one labelled as Assertion (A) and the other is labelled as Reason (R). Select the correct answer to these questions from the codes (a), (b), (c) and (d) as given below :
   (a) Both, Assertion (A) and Reason (R) are true and Reason (R) is the correct explanation of the Assertion (A).
   (b) Both, Assertion (A) and Reason (R) are true, but Reason (R) is not the correct explanation of the Assertion (A).
   (c) Assertion (A) is true, but Reason (R) is false.
   (d) Assertion (A) is false, but Reason (R) is true.

8. **Assertion (A) :** Reflex actions do not involve thinking.
   Reason (R) : Most reflex actions are controlled by the spinal cord.

9. **Assertion (A) :** In human beings, the respiratory pigment is haemoglobin present in red blood cells.
   Reason (R): Haemoglobin has a very high affinity for carbon dioxide.

10. What is the function of diaphragm in human respiratory system ? Where is it present in human body?

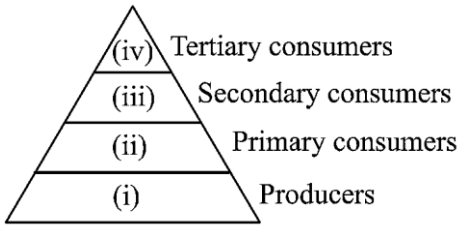
11. **(a)** State two differences between the act of chewing food and salivation on sight of food.

    OR

    (b) State two differences between pollination and fertilization.

12. **Draw a neat diagram to show germination of pollen on the female reproductive part of the flower. Name and label only the following parts :**
    (a) The part that receives the pollen grain.
    (b) The structure that carries the male germ cell to reach the female germ cell.

13. **Given below is a pyramid showing various trophic levels in an ecosystem :**



    (a) From the organisms listed below, identify which one is to be placed at which trophic level ?
    Deer, Grass, Lion, Snake, Rabbit
    (b) Discuss the reason why primary consumers will have more energy as compared to secondary consumers ?
    (c) Why is the base of the pyramid broad ?

14. **Give differences between the following:**
    (a) Nephron and neuron
    (b) Sensory nerve and motor nerve
    (c) Consumers and decomposers

15. **Mendel took garden pea plants with different characteristics, such as height to study the inheritance pattern of factors (genes). He crossed tall pea plant with short pea plant and obtained all the tall plants in the F_1 generation.**
    (a) Why only tall pea plants were observed in F_1 progeny?
    (b) By which method did Mendel obtain F_2 progeny?
    (c) (i) Write one difference between dominant and recessive trait.

    OR

    (ii) Write two observations made by Mendel about F_1 progeny.

16. **(a) Given below are certain situations. Analyse each and describe its possible impact:**
    (i) A population of bacteria living in temperate waters whose temperature increased by global warming.
    (ii) The sperm encounters the egg when it reaches the oviduct in human females.

(iii) Self pollination does not occur in a flower that contains only pistil.
(iv) Egg does not get fertilised in a human female.
(v) When the seed is placed under appropriate condition of water and air in the soil ?

OR

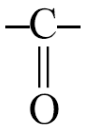
(b) Given below are certain situations. Analyse and describe what would happen when :
(i) Spores are liberated from blob-like structures of the bread mould?
(ii) Leaves of bryophyllum fall on wet soil ?
(iii) A pollen from different species land on the stigma of totally unrelated species?
(iv) Copper-T is placed in the uterus of a human female ?
(v) Spirogyra breaks into smaller fragments upon maturation?

SECTION-B

17. (i) $AgNO_3 + NaCl \longrightarrow NaNO_3 + AgCl$
(ii) $K_2SO_4 + BaCl_2 \longrightarrow BaSO_4 + 2KCl$
Which of the following options clearly describes both the reactions?
(a) (i) is double displacement, (ii) is displacement reaction.
(b) Both, (i) and (ii) are displacement reactions and precipitation reactions.
(c) Both, (i) and (ii) are double displacement reactions and precipitation reactions.
(d) (i) is displacement, (ii) is double displacement reaction.

18. Which one of the following can be used as an acid-base indicator by a visually impaired (blind) student?
(a) Turmeric (b) Vanilla essence
(c) Methyl orange (d) Litmus

19. The gases evolved on heating lead (II) nitrate crystals are :
(a) NO and O_2 (b) N_2 and NO_2
(c) NO_2 and H_2 (d) NO_2 and O_2

20. The formula of functional group for aldehyde is :
(a) -COOH (b) -CHO
(c)  (d) -OH

21. Which of the following is a poor conductor of electricity?
(a) Pb (b) Cu
(c) Ag (d) Al

22. The natural sources of oxalic acid, lactic acid and methanoic acid respectively are :
(a) tomato, curd, ant-sting
(b) tomato, orange, nettle-sting
(c) orange, milk, ant-sting
(d) orange, sour milk, nettle-sting

23. When an element ' X ' reacts with water, it starts floating. Identify the element ' X ' :
(a) Potassium (b) Calcium
(c) Sodium (d) Iron

Directions : For question number 24, two statements are given, one labelled as Assertion (A) and the other is labelled as Reason (R). Select the correct answer to this question from the codes (a), (b), (c) and (d) as given below :
(a) Both, Assertion (A) and Reason (R) are true and Reason (R) is the correct explanation of the Assertion (A).
(b) Both, Assertion (A) and Reason (R) are true, but Reason (R) is not the correct explanation of the Assertion (A).
(c) Assertion (A) is true, but Reason (R) is false.
(d) Assertion (A) is false, but Reason (R) is true.

24. Assertion (A): Carbon shares its valence electrons with other atoms of carbon or with atoms of other elements.
Reason (R) : The shared electrons belong to the outermost shells of both the atoms and lead to both atoms attaining the noble gas configuration.

25. (a) What are amphoteric oxides ?
(b) Categorise the following based on their nature :
ZnO, Na_2O, CO_2

26. (a) Name the substance oxidised and reduced in the following reaction :
$ZnO + C \longrightarrow Zn + CO$
(b) Balance the following chemical reaction :
$Pb(NO_3)_2 + KI \longrightarrow PbI_2 + KNO_3$
(c) Give one example each of electrolytic decomposition and decomposition by sunlight.

27. (a) Explain chlor-alkali process with chemical equation. Name the products formed at anode and cathode.

OR

(b) Write the preparation of following compounds with balanced chemical equation :
(i) Baking soda
(ii) Bleaching powder
(iii) Plaster of Paris

28. Read the following passage and answer the questions given below :
Most of metals occur in combined state in form of ores. Carbonate ores are converted into oxides by calcination and sulphide ores by roasting. Oxides are reduced with suitable reducing agent like carbon to get free metal. Highly reactive metals like $-Al, Mg$ are also used as reducing agents to obtain metal from their oxides. Most reactive metals are obtained by electrolytic reduction of their molten ores. Alloying is a very good method of improving the properties of a metal. We can get desired properties by this method. The electrical conductivity and melting point of an alloy is less than that of pure metals.
(a) Why carbonate or sulphide ores are converted to oxides before extraction of metal from it?
(b) Write a reaction in which Aluminium is used as a reducing agent to obtain metal from its oxide.
(c) **(i)** How is copper obtained from its ore $(Cu_2\ S)$? Give equations of the reactions.

OR

(ii) (I) Why highly reactive metals cannot be obtained from their oxides by using carbon as a reducing agent?
(II) Why solder, an alloy of lead and tin, is used for welding electrical wires together ?

29. (a) (i) Give reasons for the following :
(I) Covalent compounds are poor conductor of electricity.
(II) Soap does not form lather in hard water.
(III) Carbon shows catenation but silicon does not.
(ii) Write chemical equations for the following :
(I) Oxidation of ethanol by acidified $K_2Cr_2O_7$.
(II) Hydrogenation of ethene.

OR

(b) Mohan heated ethanol with a compound ' X ' in the presence of a few drops of conc. H_2SO_4 and observed a sweet smelling compound ' Y ' is formed. When ' Y ' is treated with sodium hydroxide it gives back ethanol and a compound ' Z '.
(i) Identify ' X ', ' Y ' and ' Z '.
(ii) Write the role of conc. H_2SO_4 in the reaction.
(iii) Write the chemical equations involved and name the reactions.

SECTION-C

30. A convex lens of focal length 15 cm , is forming a real image. If the size of image is same as the size of object, then position of object and position of image will be, respectively :
(a) -15 cm and -15 cm from lens
(b) -15 cm and +15 cm from lens
(c) -30 cm and +30 cm from lens
(d) -30 cm and -30 cm from lens

31. When you look at an object very close to your eyes, the :

(a) Ciliary muscles of your eye contract and the eye lens becomes thick.

(b) Ciliary muscles of your eye get relaxed and the eye lens becomes thick.

(c) Ciliary muscles of your eye contract and the eye lens becomes thin.

(d) Ciliary muscles of your eye get relaxed and the eye lens becomes thin.

Directions : For question number 32, two statements are given, one labelled as Assertion (A) and the other is labelled as Reason (R). Select the correct answer to this question from the codes (a), (b), (c) and (d) as given below :

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

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

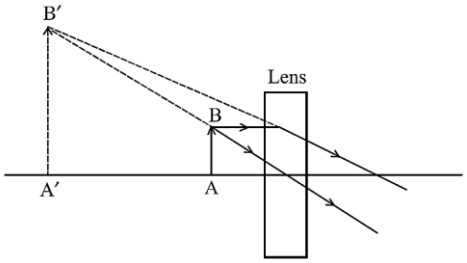
(c) Assertion (A) is true, but Reason (R) is false.

(d) Assertion (A) is false, but Reason (R) is true.

32. Assertion (A) : When rays of white light pass through a prism, on emerging they give spectrum of seven colours.

Reason (R) : It is due to the scattering of light that red light bends minimum and violet light bends the maximum.

33. The given figure shows image formation by a lens. Analyse the figure and answer the following questions :



(a) What is the type of lens used for image formation in the given ray diagram?

(b) If the real image is formed at a distance of 30 cm from the lens and the size of image is twice the size of the object, then where was the object placed?

34. (a) The resistance of a wire of 0.01 cm radius and 1.0 cm length is 7Ω. Calculate its resistivity.

OR

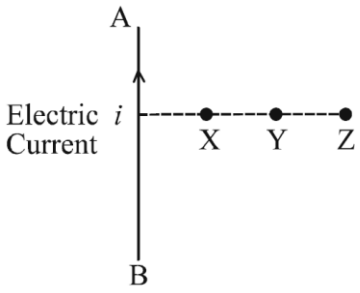
(b) An electric heater is rated 220 V; 11 A. Calculate the power consumed if the heater is operated at 200 V .

35. A person is unable to read a book placed closer than 1 meter from his eyes. Identify the defect of vision in his eyes. Draw the ray diagrams to show the defect of vision and its correction.

36. (a) Describe an activity to show that a current carrying conductor, placed in an external magnetic field experiences a force.

(b) Imagine that you are sitting in a chamber with your back to one wall. An electron beam, moving horizontally towards the front wall from the back wall, is deflected by a strong magnetic field to your right side. Find the direction of the magnetic field.

37. (a) The pattern of magnetic field due to a current carrying wire depends upon the shape made by that wire. Justify.



(b) A current carrying straight wire AB is shown in the given diagram. Out of X, Y and Z on which point will the strength of magnetic field be maximum and why ?

38. Read the following passage and answer the questions given :

Lenses can form different types of images depending upon their focal length and position of object. A convex lens can create real, inverted or virtual, erect images, while a concave lens forms only virtual and diminished images. The focal length determines the power of lens. Convex lenses have positive focal length while concave lenses

have negative focal length by convention. When lenses are placed together, their combined power is determined by the sum of their individual powers. Ray diagrams help to visualize how light converges or diverges through lens to form an image.

(a) A convex lens of focal length 20 cm is used to form an image. If an object is placed at 40 cm from the lens, what will be the position and nature of image ?

(b) Illustrate the formation of image with the help of ray diagram, when the object is placed between the optical centre and principal focus of concave lens.

(c) (i) A lens combination consists of a convex lens of focal length 30 cm and a concave lens of focal length 15 cm placed together. Find the equivalent focal length and power of this lens combination.

OR

(ii) Two lenses are placed in contact. One is a concave lens with focal length 2 m and the other is a convex lens with focal length 1.5 m . What type of lens will the combination behave as (convex or concave) ? Give reason.

39. **(a)** (i) Due to change in length and area of cross-section of a conductor, resistance of conductor changes while resistivity does not change. Why ?

(ii) Conductors of electric toasters and electric iron are made of an alloy rather than a pure metal. Why ?

(iii) Define the S.I. unit of electric current.

OR

(b) (i) How many bulbs of resistance 8Ω each should be connected in parallel combination to draw a current of 2 A from a battery of 4 V ?

(ii) Name the device used for measuring electric current. How is it connected in a circuit?

(iii) State Joule's law of heating.