CBSE Board Examination – 2025
SCIENCE
Solved Paper
Class– 10th

(All Sets of Delhi & Outside Delhi)

Maximum Marks: 80 *Time allowed: 3 hours*

GENERAL INSTRUCTIONS:

Read the following instructions very carefully and strictly follow them:

*(i) This question paper comprises **39** questions. **All** questions are compulsory.*

*(ii) This question paper is divided into **five** sections - **A, B, C, D** and **E**.*

*(iii) **Section A –** Question Nos. **1** to **20** are multiple choice type questions. Each question carries **1** mark.*

*(iv) **Section B –** Question Nos. **21** to **26** are very short answer type questions. Each question carries **2** marks. Answer to these questions should be in the range of 30 to 50 words.*

*(v) **Section C –** Question Nos. **27** to **33** are short answer type questions. Each question carries **3** marks. Answer to these questions should be in the range of 50 to 80 words.*

*(vi) **Section D –** Question Nos. **34** to **36** are long answer type questions. Each question carries **5** marks. Answer to these questions should be in the range of 80 to 120 words.*

*(vii) **Section E –** Question Nos. **37** to **39** are of 3 source-based/case-based units of assessment carrying **4** marks each with sub-parts.*

(viii) There is no overall choice. However, an internal choice has been provided in some sections. Only one of the alternatives has to be attempted in such questions.

Delhi Set– 1 **31/4/1**

SECTION – A

Select and write the most appropriate option out of the four options given for each of the questions 1 to 20. There is no negative marking for wrong answer. Each question carries 1 mark.

1. In which one of the following situations a chemical reaction does **not** occur? **1**

(a) Milk is left open at room temperature during summer

(b) Grapes get fermented

(c) An iron nail is left exposed to humid atmosphere

(d) Melting of glaciers

2. In order to prepare dry hydrogen chloride gas in humid atmosphere the gas produced is passed through a guard tube (drying tube) which contains: **1**

(a) Calcium chloride **(b)** Calcium oxide

(c) Calcium hydroxide **(d)** Calcium carbonate

3. The property by virtue of which a solid material can be drawn into thin wires is called: **1**

(a) malleability **(b)** ductility

(c) rigidity **(d)** resistivity

4. Select from the following a hydrocarbon having one C–C bond and one C≡C bond: **1**

(a) Benzene **(b)** Cyclohexane

(c) Butyne **(d)** Propyne

5. The essential element taken up from the soil by the plants to synthesise proteins is: **1**

(a) Phosphorus **(b)** Nitrogen

(c) Iron **(d)** Magnesium

6. Select **TRUE** statements about lymph from the following:

A. Lymph vessels carry lymph through the body and finally open into larger arteries.

B. Lymph contains some amount of plasma, proteins and blood cells.

C. Lymph contains some amount of plasma, proteins and red blood cells.

D. Lymph vessels carry lymph through the body and finally open into larger veins.

The true statements are: **1**

(a) A and B **(b)** B and D

(c) A and C **(d)** C and D

7. Plants like rose and banana have lost the capacity to produce: **1**

(a) flowers **(b)** buds

(c) seeds **(d)** fruits

8. In a bisexual flower the male gametes are present in the: **1**

(a) anther **(b)** ovary

(c) stigma **(d)** filament

9. When a pure-tall pea plant is crossed with a pure-dwarf pea plant, the percentage of tall pea plants in F_1 and F_2 generation pea plants will be respectively: **1**

(a) 100%; 25% **(b)** 100%; 50%

(c) 100%; 75% **(d)** 100%: 100%

10. To get an image of magnification -1 on a screen using a lens of focal length 20 cm, the object distance must be: **1**

(a) Less than 20 cm **(b)** 30 cm
(c) 40 cm **(d)** 80 cm

11. An optical device 'X' is placed obliquely in the path of a narrow parallel beam of light. If the emergent beam gets displaced laterally, the device 'X' is: **1**

(a) plane mirror **(b)** convex lens
(c) glass slab **(d)** glass prism

12. A piece of wire of resistance 'R' is cut lengthwise into three identical parts. These parts are then connected in parallel. If the equivalent resistance of this combination is R', then the value of R/R' is: **1**

(a) 1/9 **(b)** 1/3
(c) 3 **(d)** 9

13. An electric bulb is rated 220 V; 11W. The resistance of its filament when it glows with a power supply of 220 V is: **1**

(a) 4400 Ω **(b)** 440 Ω
(c) 400 Ω **(d)** 20 Ω

14. The minimum number of identical bulbs of rating 4V; 6W, that can work safely with desired brightness, when connected in series with a 240 V mains supply is: **1**

(a) 20 **(b)** 40
(c) 60 **(d)** 80

15. In the food chains given below. Select the most efficient food chain in terms of energy: **1**

(a) Grass → Grasshopper → Frog → Snake
(b) Plants → Deer → Lion
(c) Plants → Man
(d) Phytoplankton → Zooplankton → Small Fish → Big Fish

16. Which one of the following gets biomagnified at different levels in a food chain? **1**

(a) Carbon monoxide **(b)** CFC's
(c) DDT **(d)** Manure

Question Nos. 17 to 20 consist of two statements - Assertion (A) and Reason (R). Answer these questions selecting the appropriate option (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 Assertion (A).
(b) Both, Assertion (A) and Reason (R) are true, and Reason (R) is **not** the correct explanation of Assertion (A).
(c) Assertion (A) is true, but Reason (R) is false.
(d) Assertion (A) is false, but Reason (R) is true.

17. **Assertion (A):** In large animals, oxygen can reach different parts of the animal's body easily.

Reason (R): Respiratory pigments take up oxygen from the air and carry it to body tissues. **1**

18. **Assertion (A):** Concentrated nitric acid is diluted by adding water slowly to acid with constant stirring.

Reason (R): Concentrated nitric acid is easily soluble in water. **1**

19. **Assertion (A):** In reptiles, the temperature at which the fertilised eggs are kept decides the sex of the offsprings.

Reason (R): Sex is not genetically determined in some animals. **1**

20. **Assertion (A):** When ciliary muscles contract, eye lens becomes thin.

Reason (R): Ciliary muscles control the power of the eye lens. **1**

SECTION – B

Question Nos. 21 to 26 are very short answer type questions. Each question carries 2 marks.

21. Define oxidation. Identify and name the substance oxidised in the following reaction:

$CuO + H_2 \rightarrow Cu + H_2O$ **2**

22. **(A)** Show the formation of magnesium chloride by electron transfer. Write the name of the cation and anion present in the compound formed. (Atomic Number of Mg = 12, Cl = 17) **2**

OR

(B) How is zinc extracted from its ore? Name the processes involved in the extraction and write chemical equations for the reactions that occur during these processes. **2**

23. "Plants use a variety of techniques to get rid of waste material." Justify this statement giving any four ways. **2**

24. Explain with the help of a flow chart that in human beings father is responsible for the sex (male or female) of the child. **2**

25. **(A)** Draw a ray diagram to show the refraction of a ray of light passing through an equilateral glass prism. Mark the angle through which the emergent ray bends from the direction of the incident ray and also name it. **2**

OR

(B) Name the type of lenses required by the persons for the correction of their defect of vision called presbyopia. Write the structure of the lenses commonly used for the correction of this defect giving reason for such designs. **2**

26. What are magnetic field lines. List two important properties of magnetic field lines. **2**

SECTION – C

Question Nos. 27 to 33 are short answer type questions. Each question carries 3 marks.

27. **(A)** Why do we balance a chemical equation? Name and state the law that suggests the balancing of a chemical equation? Balance the following chemical equation:

$Zn + H_3PO_4 \rightarrow Zn_3(PO_4)_2 + H_2$ 3

OR

(B) Define a precipitation reaction. Give its example and also express the reaction that occurs in the form of a balanced chemical equation. 3

28. Design an activity to show that metals are good conductors of heat and have high melting points. 3

29. The digestion of food in human alimentary canal is a complex process. State the enzyme/salt present in the following and mention their function in the process of digestion: 3

(i) Saliva

(ii) Bile Juice

(iii) Pancreatic Juice

30. State two limitations of electrical impulses in multicellular organisms. Why is chemical communication better than electrical impulses as a means of communication between cells in multicellular organisms? 3

31. If we want to obtain a virtual and magnified image of an object by using a concave mirror of focal length 18 cm, where should the object be placed? Use mirror formula to determine the object distance for an image of magnification +2 produced by this mirror to justify your answer. 3

32. The electrical resistivity of three materials A, B and C at 20°C is given below: 3

Material	Resistivity (Ω m)
A	10^{17}
B	44×10^{-6}
C	1.62×10^{-8}

(i) Classify these materials as conductor, alloy and insulator.

(ii) Give one example of each of these materials and state one use of each material in the design of an electrical appliance say an electric stove or an electric iron.

33. What are decomposers? Give two examples. State how they maintain a balance in an ecosystem. 3

SECTION – D

Question Nos. 34 to 36 are Long Answer type Questions. Each question carries 5 marks.

34. (A) A carbon compound 'A' on heating with excess conc. H_2SO_4 forms a compound 'B', which on addition of one mole of hydrogen gas in the presence of nickel catalyst forms a compound 'C'. 'C' on combustion in air forms 2 moles of carbon dioxide and 3 moles of water. Identify 'A', 'B' and 'C' and write their structures. Give chemical equations of the reactions involved. Also state the role of concentrated sulphuric acid in the formation of 'B' from 'A'. 5

OR

(B) A carbon compound 'A' is widely used as a preservative in pickles and has a molecular formula $C_2H_4O_2$. This compound reacts with ethanol to form a sweet smelling compound 'B'. 5

(i) Identify the compound 'A' and write its structure.

(ii) Write the chemical equation for the reaction of 'A' with ethanol to form compound 'B'. State the role of presence of an acid in the reaction.

(iii) How can we get compound 'A' back from 'B'?

(iv) How can 'A' be obtained from ethanol?

(v) Name the gas produced when compound 'A' reacts with washing soda.

35. (A) (i) What is regeneration? Give one example of an organism that shows this process and one organism that does not. Why does regeneration not occur in the latter?

(ii) Water in a pond appears dark green and contains filamentous structures. Name these structures and the method by which they reproduce. Explain the process. 5

OR

(B) (i) Name the part performing following functions in human male reproductive system:

(a) Carries sperm

(b) Production of male gametes

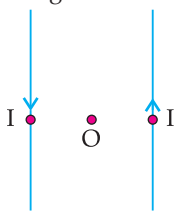
(c) Whose secretion makes the transport of sperms easier

(d) Provide suitable temperature for sperm formation

(ii) Write any two characteristics of sperms.

(iii) What are surgical contraceptive methods? Give the side effect caused by this procedure. 5

36. (A) (i) Draw the pattern of the magnetic field lines for the two parallel straight conductors carrying current of same magnitude 'I' in opposite directions as shown. Show the direction of magnetic field at a point O which is equidistant from the two conductors. (Consider that the conductors are inserted normal to the plane of a rectangular cardboard.)



(ii) In our houses we receive A.C. electric power of 220 V. In electric iron or electric heater cables having three wires with insulation of three different colours – red, black and green are used to draw current from the mains.

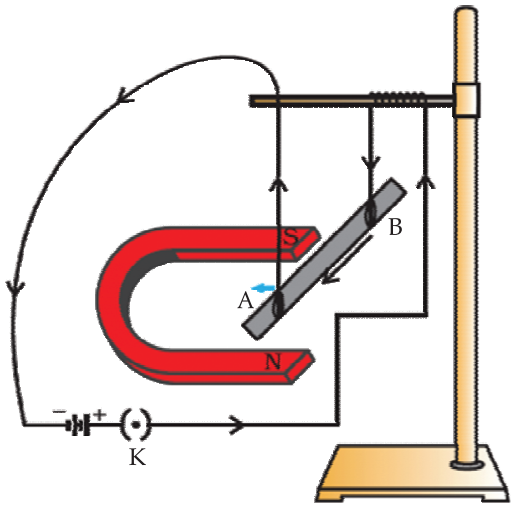
(a) What are these three different wires called? Name them colourwise.

(b) What is the potential difference between the red wire and the black wire?

(c) What is the role of the wire with green insulation in case of accidental leakage of electric current to the metallic body of an electrical appliance? **5**

OR

(B) (i) By using the given experimental set-up. How can it be shown that:



(a) a force is exerted on the current-carrying conductor AB when it is placed in a magnetic field.

(b) the direction of force can be reversed in two ways.

(ii) When will the magnitude of the force be highest?

(iii) State Fleming's left hand rule. **5**

SECTION – E

Question Nos. 37 to 39 are Source-based/Case-based questions.

37. Common salt is a very important chemical compound for our daily life. It's chemical name is sodium chloride and it is used as a raw material in the manufacture of caustic soda, washing soda, baking soda, etc. It is also used in the preservation of pickles, butter, meat, etc.

(i) Name the acid and the base from which common salt can be obtained. **1**

(ii) State the nature (acidic/basic/neutral) of sodium chloride. Give reason for the justification for your answer. **1**

(iii) (A) What happens when electric current is passed through an aqueous solution of sodium chloride (called brine)? Name the products obtained along with the corresponding places in the electrolytic cell where each of these products is obtained. **2**

OR

(iii) (B) How is washing soda obtained from sodium chloride? Give chemical equation of the reactions involved in the process. **2**

38. In life there are certain changes in the environment called 'stimuli' to which we respond appropriately. Touching a flame suddenly is a dangerous situation for us. One way is to think consciously about the possibility of burning and then moving the hand. But our body has been designed in such a way that we save ourself from such situations immediately.

(i) Name the action by which we protect ourself in the situation mentioned above and define it. **1**

(ii) Write the role of (a) motor and (b) relay neuron. **1**

(iii) (A) What are the two types of nervous system in human body? Name the components of each of them. **2**

OR

(iii) (B) Which part of the human brain is responsible for: **2**

(a) thinking

(b) picking up a pencil

(c) controlling blood pressure

(d) controlling hunger

39. The students in a class took a thick sheet of cardboard and made a small hole in its centre. Sunlight was allowed to fall on this small hole and they obtained a narrow beam of white light. A glass prism was taken and this white light was allowed to fall on one of its faces. The prism was turned slowly until the light that comes out of the opposite face of the prism appeared on the nearby screen. They studied this beautiful band of light and concluded that it is a spectrum of white light.

(i) Give any one more instance in which this type of spectrum is observed. **1**

(ii) What happens to white light in the above case? **1**

(iii) (A) List two conditions necessary to observe a rainbow. **2**

OR

(iii) (B) Draw a ray diagram to show the formation of a rainbow. Mark on it, points (a), (b) and (c) as given below: **2**

(a) Where dispersion of light occurs.

(b) Where light gets reflected internally.

(c) Where final refraction occurs.

Delhi Set– 2 **31/4/2**

Note: Except these, all other questions are available in Delhi - Set 1.

SECTION – A

8. Which one of the following has half the number of chromosomes and half the amount of DNA as compared to the non-reproductive body cells? **1**

(a) Male germ cell

(b) Female germ cell

(c) Zygote

(d) Both, male and female germ cells

17. Assertion (A): All exothermic reactions are accompanied with evolution of heat and light.

Reason (R): Combination reactions may or may not be exothermic. **1**

Answer this question selecting the appropriate option (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 Assertion (A).

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

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

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

SECTION – B

21. While burning a magnesium ribbon in air, list two safety measures which should be followed. Also state two observations of this activity. **2**

23. "In human alimentary canal the small intestine is designed to absorb the digested food." Justify this statement. **2**

24. Pure-tall (TT) pea plants are crossed with pure-dwarf (tt) pea plants. The pea plants obtained in F_1 generation are then self pollinated to produce F_2 generation. **2**

(i) What do the plants of F_1 generation look-like? Justify your answer.

(ii) What is the ratio of pure-tall plants to pure-dwarf plants in F_2 generation?

26. State the role of an electric fuse, used in series with an electrical appliance. Why should in an electric circuit a fuse with defined rating not be replaced by one with a larger rating? **2**

SECTION – C

28. Samples of four metals A, B, C and D were added one by one to the following solutions. The results obtained were tabulated as follows:

Solution Metal	Iron Sulphate	Copper Sulphate	Zinc Sulphate	Aluminium Sulphate
A	-	Displacement	No reaction	No reaction
B	Displacement	Displacement	Displacement	-
C	Displacement	?	-	No reaction
D	No reaction	No reaction	No reaction	No reaction

Use the table above to answer the following questions about metals A, B, C and D: **3**

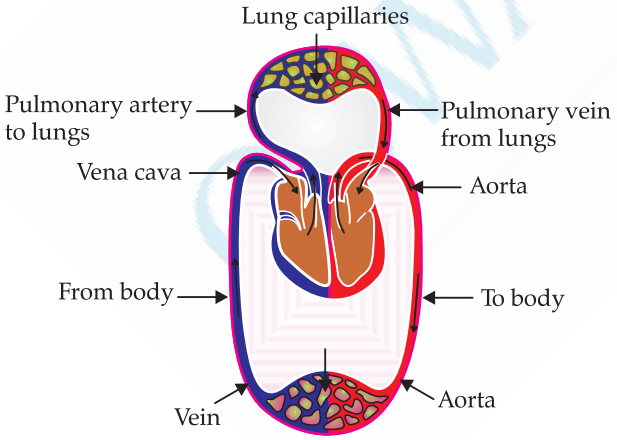
(i) Which is the least reactive metal?

(ii) What would be observed if C is added to a solution of copper sulphate?

(iii) Arrange the metals A, B, C and D in the order of their decreasing reactivity.

29. (i) Study the diagram and name the parts marked as A, B, C and D.

(ii) Write the function of A and C. **3**



SECTION – D

34. (A) (i) What are structural isomers? Draw structural isomers of butane (C_4H_{10}). Give reason why propane has no structural isomers?

(ii) What happens when butane is burnt in air? Write chemical equation for the reaction. Differentiate between the flames obtained when butane and butyne both are burnt in air in the similar conditions. **5**

OR

(B) (i) Give reason why carbon can neither form C^{4+} cations nor C^{4-} anions but forms covalent compounds.

(ii) What is meant by functional group in carbon compounds? Write in tabular form the structural formula and the functional group present in the following compounds:

(a) Ethanol

(b) Ethanoic acid **5**

Delhi Set– 3 **31/4/3**

Note: Except these, all other questions are available in Delhi - Set 1 + 2.

SECTION – A

3. An element 'M' has 25% of the electrons filled in the third shell as in the second shell. The element 'M' is: **1**

(a) Sodium **(b)** Magnesium
(c) Aluminium **(d)** Calcium

20. **Assertion (A):** White light is dispersed by a glass prism into seven colours.
Reason (R): The red light bends the least while the violet the most when a beam of white light passes through a glass prism. **1**
Answer this question selecting the appropriate option (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 Assertion (A).
(b) Both, Assertion (A) and Reason (R) are true, and Reason (R) is **not** the correct explanation of Assertion (A).
(c) Assertion (A) is true, but Reason (R) is false.
(d) Assertion (A) is false, but Reason (R) is true.

SECTION – B

21. Name the compound used in black and white photography. State whether the reaction that occurs is exothermic or endothermic. Give justification for your answer. **2**

23. Name the tissues which form the vascular bundle. State their function in plants. **2**

26. Draw the pattern of magnetic field lines due to a current carrying straight conductor. Mark on it the direction of current in the conductor and the direction of the magnetic field developed. Name the rule that helps us to determine the direction of magnetic field lines in this case. **2**

SECTION – C

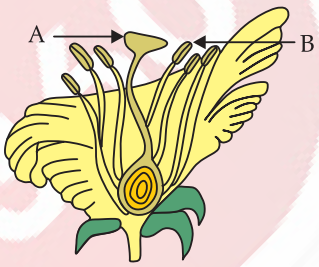
28. Name and describe the most widely used method for refining impure metals? **3**

29. What is the first step of cellular respiration? In which part of the cell does it occur? Write the equation for the process of breakdown of glucose in a human cell:
(i) in the presence of oxygen
(ii) due to lack of oxygen **3**

32. Define the term "potential difference" between two points in an electric circuit carrying current. Name and define its S.I. unit. Also express it in terms of S.I. unit of work and charge. **3**

SECTION – D

35. **(A)** Name the parts marked as 'A' and 'B' in the given diagram. Write in detail the changes that take place in a flower when the product of 'B' reaches 'A' till a fruit is formed. **5**



OR

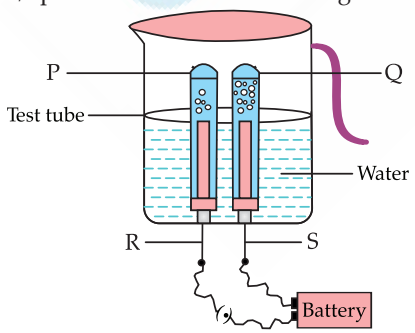
(B) In human female reproductive system state the changes that take place once fertilisation has taken place. Write the role of placenta in this process. What happens when the egg is not fertilised? **5**

Outside Delhi Set– 1 **31/6/1**

SECTION – A (20 × 1 = 20)

In this section, Question Nos. 1 to 20 are Multiple-Choice Questions.
All questions are compulsory.

1. In the following experimental setup of electrolysis of water, if P and Q are the gases collected in the test tubes enclosing the electrodes R and S, then select the option/options in which the matching is correct: **1**



(i) P-Oxygen gas , R-Anode
(ii) P-Hydrogen gas , R-Cathode
(iii) Q-Hydrogen gas , S-Cathode
(iv) Q-Oxygen gas , S-Anode
(a) (i) and (ii) **(b)** (iii) and (iv)
(c) (i) and (iii) **(d)** (ii) and (iv)

2. You have three aqueous solutions A, B and C as given below: **1**

A - Potassium nitrate
B - Ammonium chloride
C - Sodium carbonate

The ascending order of the pH of these solutions is:
(a) A<B<C **(b)** B<C<A
(c) C<A<B **(d)** B<A<C

3. Select from the following a statement which is **not true** about burning of magnesium ribbon in air: **1**

(a) It burns with a dazzling white flame.
(b) A white powder is formed on burning.

(c) It is an endothermic reaction.
(d) It is an example of a combination reaction.

4. A hydrocarbon which **does not** belong to the same homologous series of carbon compounds is **1**
(a) C_4H_{10} **(b)** C_6H_{14}
(c) C_7H_{14} **(d)** $C_{10}H_{22}$

5. The colour of the solution observed after about 1 hour of placing iron nails in copper sulphate solution is **1**
(a) Blue **(b)** Pale green
(c) Yellow **(d)** Reddish brown

6. Juice of tamarind turns blue litmus to red. It is because of the presence of a chemical compound called **1**
(a) Acetic acid **(b)** Methanoic acid
(c) Oxalic acid **(d)** Tartaric acid

7. The water of crystallisation is present in
(i) Bleaching Powder **(ii)** Plaster of Paris
(iii) Washing Soda **(iv)** Baking Soda
(a) (ii) and (iv) **(b)** (ii) and (iii)
(c) (i) and (iii) **(d)** (i) and (iv)

8. A tall pea plant with round seeds (TTRR) is crossed with a short pea plant with wrinkled seeds (ttrr). The F_1 generation will be **1**
(a) 25% tall with round seeds
(b) 50% tall with wrinkled seeds
(c) 75% tall with wrinkled seeds
(d) 100% tall with round seeds

9. A pair of endocrine glands located in the human brain is **1**
(a) Parathyroid and Pituitary
(b) Pineal and Thymus
(c) Hypothalamus and Thymus
(d) Hypothalamus and Pineal

10. Select the option having correct matching of the organism given in Column I with the mode of reproduction in Column II: **1**

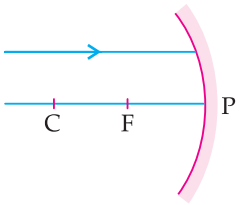
Column I	Column II
P. Leishmania	**1.** Regeneration
Q. Spirogyra	**2.** Multiple Fission
R. Planaria	**3.** Binary Fission
S. Plasmodium	**4.** Fragmentation
	5. Budding

(a) P-4, Q-2, R-1, S-3 **(b)** P-3, Q-4, R-5, S-2
(c) P-3, Q-4, R-1, S-2 **(d)** P-4, Q-3, R-2, S-1

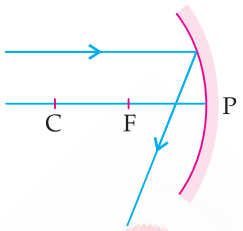
11. The basic filtration unit of the excretory system in human beings is: **1**
(a) Nephron **(b)** Urethra
(c) Neuron **(d)** Urinary bladder

12. In human alimentary canal, the digestive juice secreted by the gastric glands are **1**
(a) Bile, Trypsin, Pepsin
(b) Hydrochloric acid, Pepsin, Mucus
(c) Lipase, Bile, Mucus
(d) Salivary amylase, Pepsin, Bile

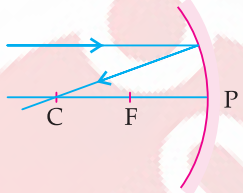
13. Identify from the following the ray diagram which shows the correct path of the reflected ray for the ray incident on a concave mirror as shown: **1**



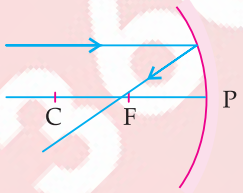
(a)



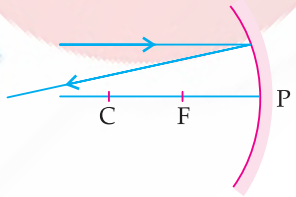
(b)



(c)



(d)



14. The part of human eye which controls the amount of light entering into it. **1**
(a) Iris **(b)** Cornea
(c) Ciliary muscles **(d)** Pupil

15. Consider the following food chain:
Grass → Grasshopper → Frog → Snake → Eagle
If the amount of energy available at third trophic level is 50 kJ, the available energy at the producer level was: **1**
(a) 0.5 kJ **(b)** 5 kJ
(c) 500 kJ **(d)** 5000 kJ

16. The **incorrect** statement about ozone is
(a) It is a deadly poisonous gas.
(b) It shields the surface of the earth from UV radiation from sun.
(c) It is used as a refrigerant and in fire-extinguishers.
(d) It is formed by combining oxygen molecule with free oxygen atom.

Nos. 17 to 20, two statements are given-one labelled as Assertion (A) and the other 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 and 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.

17. Assertion (A): Carbon and its compounds are our major sources of fuels.

Reason (R): Most of the carbon compounds on burning release a large amount of heat and light. **1**

18. Assertion (A): Xylem tissue moves water and minerals obtained from the soil by the roots.

Reason (R): Xylem tissue is found only in the roots of a plant. **1**

19. Assertion (A): In the common domestic circuits the earth wire is connected to a metallic plate buried deep inside the earth.

Reason (R): Earth wire ensures that any leakage of current to the metallic body of the appliance keeps its potential to that of the earth, so the user may not get a severe electric shock. **1**

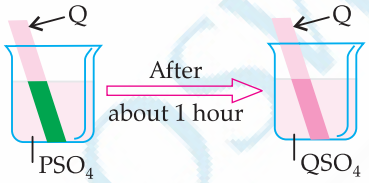
20. Assertion (A): Food web is a network of several food chains operating in an ecosystem.

Reason (R): Food web decreases the stability of an ecosystem. **1**

SECTION – B

Question Nos. 21 to 26 are very short answer type questions. Each question carries 2 marks.

21. A light green coloured solution of sulphate salt of metal 'P' is taken in a beaker, a rod of another metal "Q' is put in this solution as shown the following figures: **2**



(Light Green Solution) (Colourless Solution)

Identify the metals 'P' and 'Q' and write its chemical equation for the reaction that occurs. State the conclusion of this reaction in terms of reactivity series of metals.

22. (a) How is brain protected in our body?

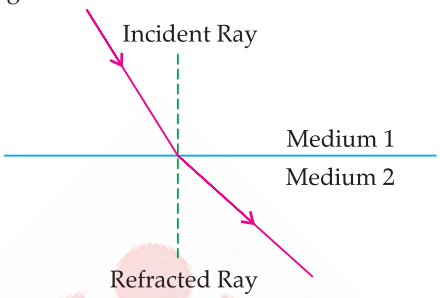
(b) A doctor finds in one of his patients that he is not maintaining a proper posture and balance of his body. State the region of brain and also the part of brain which is responsible for it. **2**

23. (a) "Proteins control the expression of various characters." Explain this statement by taking an example of "tallness" as a characteristic in plants. **2**

OR

(b) Explain the mechanism of inheritance used by sexually reproducing organisms to ensure the stability of DNA of the species. **2**

24. Study the figure in which the path of a ray of light going from Medium 1 to Medium 2 is shown.



(a) Out of the two Media – Medium 1 and Medium 2, in which is the speed of light more?

(b) State reason of bending of the refracted ray away from the normal.

(c) Express refractive index of Medium 2 with respect to Medium 1 in terms of speed of light in two media. **2**

25. (a) Give reasons:

(i) The sky appears dark to passengers flying at very high altitude.

(ii) 'Danger' signal lights are red in colour. **2**

OR

(b) What is a rainbow? "We see a rainbow in the sky only after the rainfall." Why? **2**

26. We do not clean natural ponds or lakes whereas an aquarium or a swimming pool needs to be cleaned regularly. Why? **2**

SECTION – C

Question Nos. 27 to 33 are short answer type questions. Each question carries 3 marks.

27. Write balanced chemical equation for the reactions that occur when

(a) steam is passed over red hot iron.

(b) natural gas is burnt in air.

(c) glucose reacts with oxygen in the cells of our body and provides energy. **3**

28. (a) State the chemical property in each case on which the following uses of baking soda are based upon:

(i) as an anti-acids

(ii) as a constituent in making baking powder

(iii) in soda-acid fire-extinguishers **3**

OR

(b) Write chemical equations to show what happens when an acid reacts with a

(i) metal

(ii) base and

(iii) carbonate

Write the name of the main product formed in each case. 3

29. Name the blood vessel that brings (i) oxygenated blood (ii) deoxygenated blood, to the human heart. Also name that chamber of the heart which receives deoxygenated blood and state how deoxygenated blood from this chamber is sent to lungs for oxygenation. 3

30. The gene combination of purple flowered pea plants is denoted as (WW) and that of white flowered pea plants as (ww), when these two plants are crossed F_1 generation is obtained.

(a) List two observations made by Mendel in F_1 generation plants.

(b) Give the (i) percentage of white flowered plants and (ii) ratio of the gene combinations WW, Ww and ww in F_2 generation.

(c) Write one difference between dominant and recessive trait. 3

31. A student placed a candle flame at different distances from a convex lens and focused its image on a screen. He recorded his observation in tabular form as given below:

S.No.	Distance of flame from the lens (cm)	Distance of the image from the lens
1	–90	+18
2	–60	+20
3	–40	+24
4	–30	+30
5	–24	+40
6	–20	+60
7	–18	+90
8	–12	+120

Analyse the observation table and on the basis of your analysis only, answer the following questions (without doing any calculations):

(a) What is the focal length of the convex lens used? Give reason to justify your answer.

(b) Which one of the sets of observations is **not** correct and why?

(c) Draw ray diagram to show image formation for any correct set of observation. 3

32. A person uses lenses of +2.0 D power in his spectacles for the correction of his vision.

(a) Name the defect of vision the person is suffering from.

(b) List two causes of this defect.

(c) Determine the focal length of the lenses used in the spectacles. 3

33. **(a)** Explain the statement "Potential difference between two points is 1 volt".

(b) What do the symbols given below represent in an electric circuit? Write one function of each. 3

(i) (ii)

SECTION – D

Question Nos. 34 to 36 are long answer type questions. Each question carries 5 marks.

34. **(a)** Name an alcohol and a carboxylic acid having two carbon atoms in their structures. Draw their structures and state how this alcohol can be converted into a carboxylic acid. What happens when these two compounds react in the presence of an acid? Write chemical equations for the reactions involved in the two cases mentioned above. 5

OR

(b) What are soaps? Write the structure of a soap molecule. Explain the cleansing action of a soap. Why are soaps not considered suitable for washing clothes in a region where water is hard? How is this problem overcome? 5

35. **(a)** Define Puberty. List any two changes seen in boys at the time of puberty.

(b) Why are testes in human males located outside the abdominal cavity in scrotum?

(c) List any three techniques of contraception used by humans. Which one of these is **not** meant for males? 5

OR

(a) Name the part performing following functions in human female reproductive system:

(i) production of eggs

(ii) site of fertilisation

(iii) site of implantation

(iv) entry of the sperms

(b) What changes are observed in the uterus:

(i) subsequent to implantation of zygote and

(ii) if an egg does not get fertilised? 5

36. **(a)** What are magnetic field lines? How is the direction of magnetic field at a point determined? Draw the pattern of magnetic field lines of the magnetic field produced by a current carrying circular loop. Mark on it the direction of (i) current and (ii) magnetic field lines. Name the two factors on which the magnitude of the magnetic field due to a current carrying coil depends. 5

OR

(b) Why can't two magnetic field lines cross each other? Draw magnetic field lines showing the direction of the magnetic field due to a current carrying long straight solenoid. State the conclusion which can be drawn from the pattern of magnetic field lines inside the solenoid. Name any two factors on which the magnitude of the magnetic field due to this solenoid depends. 5

SECTION – E

Question Nos. 37 to 39 are Case/Source based questions. Each question carries 4 marks.

37. Many pure metals like copper, iron and gold are very soft and as such are considered unsuitable for certain uses. Metallic objects around us such as cooking utensils, statues, ornaments, guns, etc. are actually not made up of pure metals. Instead of pure metals, alloys are used in the design of most of the useful objects. Making alloys enhances the basic properties of a metal which is the primary constituent (metal) of an alloy. **4**

(I) How does electrical conductivity and melting point of a metal change when it is converted to its alloy by mixing a small amount of an element in it? **1**

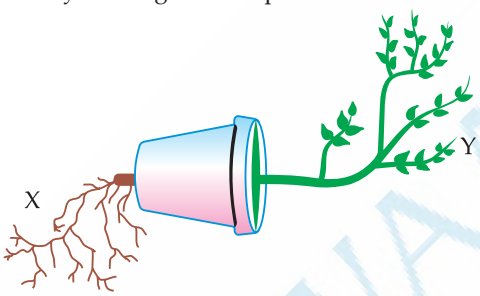
(II) Name an alloy used for welding two wires together in an electric circuit. Write its major constituents. **1**

(III) (a) What are alloys? How is 'Brass' (an alloy) prepared? **2**

OR

(III) (b) What is stainless steel? How is it prepared? Write one important property which makes it more useful in making cooking utensils as compared to its primary metal. **2**

38. The growth movements of plant parts in which the direction of the stimulus determines the direction of the response is known as tropic movements or tropism. Plants also have non-directional movements which may not be growth dependent. **4**



(I) Name the movement which causes 'X' and Y to grow downwards and upwards respectively. (Refer above figure) **1**

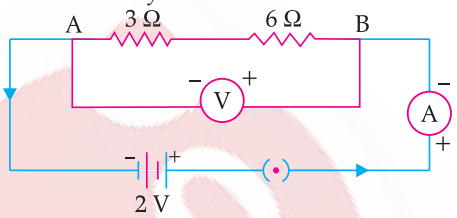
(II) Write the name of a hormone that plays a major role in (i) falling of leaves (ii) rapid cell division **1**

(III) (a) Leaves of the sensitive plant move very quickly in response to 'touch'. How is this stimulus of touch communicated and explain how the movement takes place. **2**

OR

(III) (b) Name the plant hormone which is synthesised at the shoot tip. How does this hormone help the plant to bend towards light? **2**

39. Study the circuit shown in which two resistors X and Y of resistances 3 Ω and 6 Ω respectively are joined in series with a battery of 2 V. **4**



(I) Draw a circuit diagram showing the above two resistors X and Y joined in parallel with same battery and same ammeter and voltmeter. **1**

(II) In which combination of resistors will the (i) potential difference across X and Y and (ii) current through X and Y, be the same? **1**

(III) (a) Find the current drawn from the battery by the series combination of the two resistors (X and Y). **2**

OR

(III) (b) Determine the equivalent resistance of the parallel combination of the two resistors (X and Y). **2**

Outside Delhi Set– 2 **31/6/2**

Note: Except these, all other questions are available in Outside Delhi - Set 1.

SECTION – A (20 × 1 = 20)

2. The formula of washing soda is: **1**

(a) $NaHCO_3.6H_2O$ **(b)** $Na_2CO_3.6H_2O$

(c) $NaHCO_3.10H_2O$ (d) **$Na_2CO_3.10H_2O$**

6. The nature of aqueous solution of potassium nitrate is: **1**

(a) acidic **(b)** basic

(c) neutral **(d)** alkaline

8. Mendel obtained F_2 generation by **1**

(a) self pollinating F_1 generation plants

(b) cross pollinating F_1 generation plants with plants having dominant trait.

(c) cross pollinating F_1 generation plants with plants having recessive trait.

(d) cross pollinating both the parents.

10. When a seed germinates the root grows downwards and a small shoot grows upward. This shoot is known as **1**

(a) radicle **(b)** stem

(c) cotyledon **(d)** plumule

14. Most of the refraction for the light rays entering the eye occurs at **1**

(a) Iris **(b)** Pupil

(c) Crystalline lens **(d)** Outer surface of cornea

16. Green plants occupy the first trophic level in every food chain because they

(a) exist over a large area.

(b) have very less concentration of harmful chemicals.

(c) have to feed large number of herbivores.

(d) can synthesise food by photosynthesis.

SECTION – B

21. Cinnabar is an ore of a metal 'X'. When this ore is heated in air, it is first converted into oxide of 'X' (XO) and then reduced to metal 'X' on further heating.

Identify metal 'X' and write chemical equations for the reactions that occur in the above processes. **2**

26. Indicate the flow of energy in a food chain operating in an ecosystem. Why is it uni-directional? Give reason. **2**

SECTION – C

28. **(a)** In an experiment a student dipped pH papers in four different solutions A, B, C and D and reported his observation as given below:

Solution	A	B	C	D
Colour of pH paper	Light green	Blue	Green	Red

(i) In which one of these solutions is the concentration of (1) hydrogen/hydronium ions; (2) hydroxyl ions maximum?

(ii) Give one example each of the two solutions identified in (i) above.

(iii) What would be the pH of the resultant mixture obtained when these two solutions are mixed together in equal proportions? Justify your answer. **3**

OR

(b) **(i)** Name the gas liberated when an acid reacts with a metal. How is this gas tested?

(ii) Write the chemical equation for the reaction of zinc metal with

(1) hydrochloric acid, and

(2) sodium hydroxide

Name the compound of zinc obtained in each case. **3**

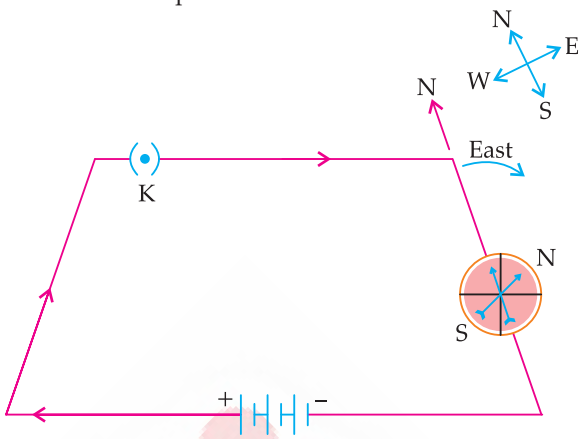
29. An object of size 5 cm is placed at a distance of 30 cm from the optical centre of a converging lens of focal length 20 cm. Use lens formula to determine the position and size of the image formed. **3**

33. **(a)** Draw a diagram to show the dispersion of white light by a glass prism.

(b) What is spectrum? Give reason for its formation. **3**

SECTION – D

36. **(a)** Study the following electric circuit diagram and answer the questions that follow:



(i) What does the circuit diagram show?

(ii) What will happen if the direction of current is reversed? Justify your answer giving circuit diagram.

(b) Name and state the rule to determine the direction of magnetic field associated with a straight current carrying conductor. **5**

OR

(a) Draw the pattern of magnetic field lines of

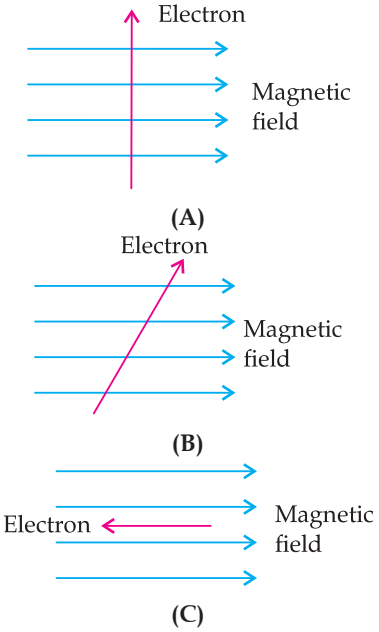
(i) a bar magnet

(ii) a current carrying solenoid

List two distinguishing features between the two magnetic fields.

(b) Study the following three diagrams in which the entry of an electron in a magnetic field is shown. Identify the case in which the magnetic force experienced by the electron is (i) maximum, and (ii) minimum.

Give reason for your answers in each case. **5**



Outside Delhi Set– 3 **31/6/3**

Note: Except these, all other questions are available in Outside Delhi - Set 1 + 2.

SECTION – A

1. Example of thermal decompoaition reaction are **1**

(i) $2AgCl \rightarrow 2Ag + Cl_2$

(ii) $CaCO_3 \rightarrow CaO + CO_2$

(iii) $2H_2O \rightarrow 2H_2 + O_2$

(iv) $2KClO_3 \rightarrow 2KCl + 3O_2$

(a) (i) and (ii) **(b)** (ii) and (iii)

(c) (iii) and (iv) **(d)** (ii) and (iv)

3. Which one of the following metals is protected from corrosion by a layer of its own oxide? **1**

(a) Aluminium **(b)** Copper

(c) Silver **(d)** Gold

8. Electrical impulse travels in a neuron from **1**

(a) Nerve ending → Axon → Cell body → Dendrite

(b) Dendrite → Cell body → Axon → Nerve ending.

(c) Cell body → Dendrite → Axon → Nerve ending

(d) Dendrite → Axon → Nerve ending → Cell body

11. Which one of the following is **not** an excretory product in plants? **1**

(a) CO_2 **(b)** Starch

(c) Resins and gums **(d)** Dead cells

13. The curvature of eye lens of human eye **1**

(a) is fixed.

(b) can be increased

(c) can be decreased.

(d) increases or decreases as the case maybe,

15. In the following groups of wastes, which group contains only non-biodegradable wastes? **1**

(a) Leather footwear, Plastic plate, Polythene bag

(b) Empty medicine bottle, Milk packet, Aluminium can

(c) Used tea leaves, Cardboard box, Iron nail

(d) Plastic Syringes, Newspaper, Ball point pen

SECTION – B

21. Name a metal found in the earth's crust

(i) in free state and

(ii) in the form of its compound.

State where each of these metals are placed in the reactivity series of metals. **2**

26. Write the percentage of the energy of sunlight captured by green plants,to convert it into food energy. Explain the fate of this energy when green plants are eaten by primary consumers. **2**

27. Explain why respiration is considered as an exothermic reaction. Give the chemical equation for this reaction. **2**

SECTION – C

30. (a) "In human beings the genes inherited from the parents decide whether the newborn individual is male or female."

Explain this statement with the help of a flow diagram.

(b) "Some animals rely on environmental cues for sex determination." Justify this statement giving an example. **3**

32. A person uses lenses of power –0.5 D in his spectacles for the correction of his vision.

(a) Name the defect of vision the person is suffering from.

(b) List two causes of this defect.

(c) Determine the focal length of the lenses used in the spectacles. **3**

SECTION – D

35. (a) Name the method by which Amoeba and Leishmania reproduce. Write a major difference in the way they divide to produce new individuals.

(b) What is asexual reproduction? Explain the process of budding in Hydra.

(c) Give two methods used to grow rose and jasmine plants by vegetative propagation. **5**

OR

(a) Write one function each of the parts – (i) petals (ii) anther (iii) style and (iv) ovary of a bisexual flower.

(b) Give one example each of a unisexual flower and a bisexual flower. Mention the changes which a flower undergoes after fertilisation. **5**

■■

ANSWERS

Delhi Set– 1 **31/4/1**

SECTION – A

1. Option (d) is correct.

Explanation: The melting of glaciers is a physical change in which ice is converted into water, only a solid state is changed into a liquid state.

2. Option (a) is correct.

Explanation: Calcium chloride is used as an absorbent in the guard tube which can absorb moisture present in the air.

3. Option (b) is correct.

Explanation: Ductility is the physical property of a metal which means that metal can stretch rather than break.

4. Option (d) is correct.

Explanation: Propyne contains three carbons. Carbon 1 and Carbon 2 are attached through a triple bond and carbon 2 and carbon 3 are attached through a single bond.

5. Option (b) is correct.

Explanation: Nitrogen is an essential nutrient that plants absorb from the soil in the form of nitrates (NO_3^-) or ammonium (NH_4^+). It is a key component of amino acids, which are the building blocks of proteins.

6. Option (b) is correct.

Explanation: Lymph contains some amount of plasma, proteins and white blood cells (mainly lymphocytes) that help in immune defence. However, red blood cells (RBCs) are absent. Lymph from the intercellular spaces enters the lymphatic capillaries, which merge to form larger lymph vessels that eventually drain into larger veins.

7. Option (a) is correct.

Explanation: Plants like roses and bananas have lost the ability to produce seeds for reproduction. Instead, they reproduce through vegetative propagation. Roses are commonly propagated using stem cuttings or grafting, where a part of the plant is used to grow a new one. Bananas reproduce through underground rhizomes or suckers, as most cultivated banana varieties are sterile and do not produce viable seeds.

8. Option (d) is correct.

Explanation: In a bisexual flower, male gametes are present in the pollen grains, which are produced by the anthers of the stamen.

9. Option (c) is correct.

Explanation: When a pure tall (TT) plant is crossed with a pure dwarf (tt) plant, all F_1 offspring have the genotype Tt (heterozygous tall) and because T (tall) is dominant, 100% of the plants in F_1 are tall. When F_1 plants are self-crossed (Tt × Tt), the plants in F_2 are 75% Tall (TT and Tt) and 25% Dwarf (tt).

10. Option (c) is correct.

Explanation: Magnification: $m = \frac{-v}{u}$. Since $m = -1$, we have $-1 = \frac{v}{u}$, which simplifies to v = $-u$. This means the image distance is equal to the object distance.

Lens formula: Substitute $v = -u$ and $f = 20$ cm into the lens formula:

$$\frac{1}{f} = \frac{1}{v} - \frac{1}{u}$$

$$\frac{1}{20} = -\frac{1}{u} - \frac{1}{u}$$

$$\frac{1}{20} = -\frac{2}{u}$$

$$u = -2 \times 20 = -40 \text{ cm}$$

However, the magnitude of the object distance is 40 cm.

Alternate method :

Since the magnification is -1, it means that the magnitudes of the object distance (u) and the image distance (v) are equal but in opposite directions. This occurs when the object is placed at twice the focal length ($2f$) from the lens.

Given that $f = 20$ cm, we calculate:

$$u = 2f = 2 \times 20 \text{ cm}$$

$$= 40 \text{ cm}$$

11. Option (c) is correct.

Explanation: When a parallel beam of light enters a glass slab obliquely, it refracts, travels through the glass slab and then refracts again as it exits. The emergent beam is parallel to the incident beam but laterally displaced. The amount of displacement depends on the angle of incidence and the thickness of the glassslab.

12. Option (d) is correct.

Explanation: When the wire is cut into 3 equal parts, the resistance of each part will be $\frac{R}{3}$.

Now they are connected in parallel, so

$$\frac{1}{R'} = \frac{1}{\frac{R}{3}} + \frac{1}{\frac{R}{3}} + \frac{1}{\frac{R}{3}}$$

$$\frac{1}{R'} = \frac{3}{R} + \frac{3}{R} + \frac{3}{R} = \frac{9}{R}$$

$$R' = \frac{R}{9}$$

Now $\frac{R}{R'} = 9$

13. Option (a) is correct.

Explanation: Resistance $= \frac{V^2}{P} = \frac{220 \times 220}{11} = 4400\,\Omega$

14. Option (c) is correct.

Explanation: Resistance of each bulb

$$R = \frac{V^2}{P}$$

$$\Rightarrow R = \frac{(4)^2}{6}$$

$$\Rightarrow R = \frac{8}{3}\,\Omega$$

Maximum current that can flow through the bulb without damaging it

$$I_{max} = \frac{P}{V}$$

$$\Rightarrow \quad I_{max} = \frac{6}{4}$$

$$\Rightarrow \quad I_{max} = 1.5A$$

Thus, minimum resistance required in the circuit

$$R_{min} = \frac{V_S}{I_{max}}$$

$$\Rightarrow \quad R_{min} = \frac{240}{1.5}$$

$$\Rightarrow \quad R_{min} = 160\,\Omega$$

Let n number of bulbs are connected in series in the circuit. Equivalent resistance of n bulbs

$$Req(R_{min}) = nR = \frac{8n}{3}$$

But, $\frac{8n}{3} \le 160$

$$\Rightarrow \quad n \le 60$$

Thus, the minimum number of bulbs required is 60.

15. Option (c) is correct

Explanation: A shorter food chain is more efficient than a longer food chain because less energy is lost at each trophic level, resulting in more energy reaching the top consumers. The food chain in option (c) has only two trophic levels and energy loss is minimal, making it an efficient way to transfer energy.

16. Option (c) is correct

Explanation: Biomagnification is the process by which the concentration of harmful substances like DDT (Dichlorodiphenyltrichloroethane) increases at higher trophic levels in a food chain. The increased concentration of DDT at each tropic level, poses severe threats to top predators and humans due to its long-term persistence in the ecosystem.

17. Option (a) is correct

Explanation: In large animals, oxygen is efficiently transported by haemoglobin, a respiratory pigment in red blood cells. Haemoglobin binds oxygen in the lungs and carries it through the circulatory system. The heart pumps oxygen-rich blood to body tissues, where haemoglobin release oxygen for cellular respiration.

18. Option (d) is correct

Explanation: The acid must always be added slowly to water with constant stirring as the process is highly exothermic.

19. Option (d) is correct

Explanation: In some animals, sex is influenced by environmental factors rather than genetics. In some reptiles, like turtles and crocodiles, sex is not genetically determined but the temperature at which eggs are incubated influences the sex of the hatchlings, a phenomenon known as Temperature-Dependent Sex Determination (TSD).

20. Option (d) is correct.

Explanation: When ciliary muscles contract, the eye lens becomes *thicker* (more convex), not thinner. Ciliary muscles control the power of the eye lens. By contracting and relaxing, they change the shape of the lens and therefore its focal length and refractive power. This process is called accommodation.

SECTION – B

21. Oxidation is the chemical process, where a substance loses electrons or hydrogen or gains oxygen atoms.

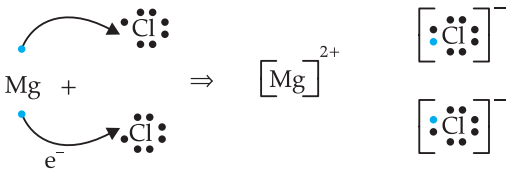
In this reaction, the substance that is oxidised is hydrogen (H_2)

22. **(A)** Atomic number of Magnesium (Mg) atom is 12.

Electronic configuration= 2,8,2. So, it contains 2 valence electrons and loses 2 electrons to attain noble gas configuration and forms Magnesium ion (Mg^{2+})

Atomic number of Chlorine (Cl) atom is 17.

Electronic configuration= 2,8,7. So, it gains 1 electron to attain noble gas configuration and forms Chloride ion Cl^-.



Magnesium atom (2, 8, 2)	Chlorine atoms (2, 8, 7)	Magnesium ion (2, 8,)	Chloride ions (2, 8, 8)

Magnesium chloride ($MgCl_2$)

OR

(B) The metals in the middle of the reactivity series like Zinc are moderately reactive and they are found as oxides- ZnO, sulphides - ZnS or carbonates- $ZnCO_3$ in the Earth's crust.

Chemical reactions involved in the roasting and calcination of Zinc ores are as follows:

Concentration: The ore is crushed and then concentrated by the froth flotation process.

Roasting: Sulphide ores are heated below their melting point in the presence of air to form Zinc oxide.

$$2ZnS + 3O_2 \rightarrow 2ZnO + 2SO_2$$

Calcination: Carbonate ores are heated below their melting point in the absence of air to form Zinc oxide

$$ZnCO_3 \rightarrow ZnO + CO_2$$

Reduction of oxide ore: It can be done by heating oxide ore with a suitable reducing agent like carbon.

$$ZnO + C \rightarrow Zn + CO$$

Purification: Zinc is purified by electrolytic refining.

23. Plants use various techniques to get rid of waste, ensuring their proper growth and functioning. Some of the key waste removal methods include:

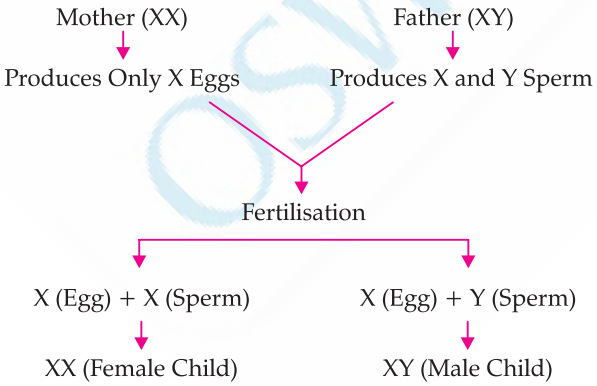
(i) **Leaf Fall (Abscission):** Plants store waste materials like excess salts and metabolic wastes in old leaves, which eventually shed during leaf fall.

(ii) **Transpiration:** Excess water and some dissolved wastes are removed through stomata in leaves.

(iii) **Storing Waste in Vacuoles:** Plants store toxic wastes like alkaloids, tannins and latex in vacuoles of leaves, bark, or fruits.

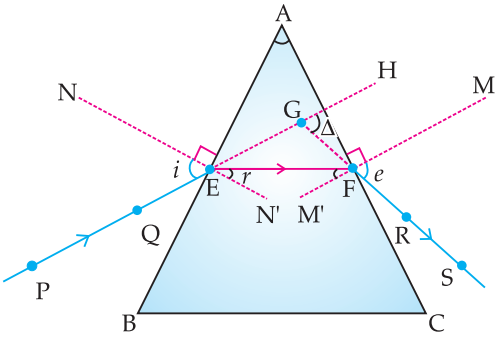
(iv) **Excretion through Roots:** Some plants release waste into the soil through roots, such as organic acids or resins.

24. Following is the flowchart to show that in humans, the father is responsible for determining the sex of the child:



Since the mother always contributes an X chromosome, the father's sperm (X or Y) decides the child's sex.

25. (A)



The angle through which the emergent ray bends from the direction of the incident ray is called ∠Δ = Angle of deviation.

OR

(B) The lens is bi-focal which is used for the correction of presbyopia.

A common type of bi-focal lens consists of both concave and convex lenses. The upper portion consists of a concave lens. It facilitates distant vision. The lower part is a convex lens and it facilitates near vision.

26. Magnetic field lines are imaginary lines tangents to those that show the direction and density of the lines indicates the strength of a magnetic field. They are used to represent the magnetic field around a magnet.

Two properties of magnetic field lines

(i) Outside the magnet, the field lines emerge from the north pole and enter at the south pole. Inside the magnet, the direction of field lines is from its south pole to its north pole. Thus, the magnetic field lines are closed curves.

(ii) No two field lines are found to cross each other. If they did, it would mean that at the point of intersection, the compass needle would point towards two directions, which is not possible.

SECTION – C

27. (A) A balanced chemical equation has the same number of atoms on both sides of the equation.

Chemical equations are balanced to follow the law of conservation of mass, which states that matter can neither be created nor destroyed.

$$3Zn\ (s) + 2H_3PO_4\ (aq) \rightarrow Zn_3(PO_4)_2\ (aq) + 3H_2\ (aq)$$

OR

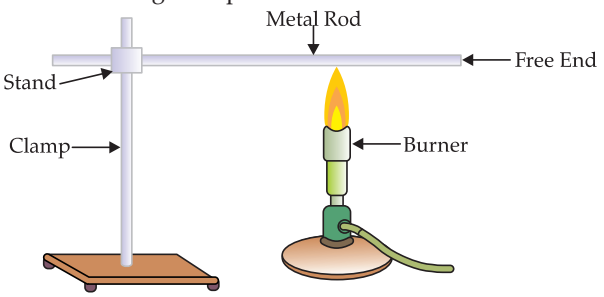
(B) A chemical reaction in which an insoluble substance is formed is called a precipitation reaction.

Example: $Na_2SO_4\ (aq) + BaCl_2\ (aq) \rightarrow BaSO_4\ (ppt.) + 2NaCl\ (aq)$

Sodium sulphate reacts with Barium chloride to form precipitates of Barium sulphate.

28. The iron metal rod is heated at one end with the help of a burner. After some time, the other end of the rod gets very hot. This activity proves that metals

are good conductors of heat and to melt the metal, it needs a high temperature.



29. (i) Saliva: Saliva contains the enzyme salivary amylase, which breaks down starch into maltose and smaller carbohydrates.

(ii) Bile juice: It contains bile salts, but no digestive enzymes. Bile plays a key role in fat digestion by breaking large fat droplets into smaller ones, a process called emulsification. This increases the surface area for lipase to act efficiently.

(iii) Pancreatic juice: It contains digestive enzymes and bicarbonate ions. Amylase breaks down starch into maltose, while lipase helps digest fats into fatty acids and glycerol. The bicarbonate ions neutralise acidic chyme from the stomach and create an alkaline environment for enzyme activity.

30. Limitations of Electrical Impulses in Multicellular Organisms

(i) Restricted Communication: Electrical impulses can only reach cells connected by nervous tissue and do not communicate with every cell in the body.

(ii) Recovery Time: After transmitting an impulse, a nerve cell requires time to reset before generating and transmitting a new impulse, preventing continuous signalling.

Chemical communication (e.g., hormones) is better than electrical impulses in multicellular organisms because they can potentially reach all cells in the body, irrespective of nervous connections, and can occur continuously and consistently.

31. The object should be placed between the pole and focus i.e., at a distance less than 18 cm to get a virtual and magnified image using a concave mirror of focal length 18 cm.

For a concave mirror, focal length, $f = -18$ cm, magnification, $m = +2$

$$m = -\frac{v}{u} = 2$$

$$\Rightarrow \quad v = -2u$$

Applying mirror formula,

$$\frac{1}{v} + \frac{1}{u} = \frac{1}{f}$$

$$\frac{1}{-2u} + \frac{1}{u} = \frac{1}{-18}$$

$$\frac{-1+2}{2u} = \frac{1}{-18}$$

$$\frac{1}{2u} = \frac{1}{-18}$$

$$u = -9 \text{ cm}$$

Hence, the position of the object is in front of the mirror at a distance of 9 cm from the pole.

32. (i) Classification:

Material A: Resistivity is 10^{17} Ωm. This is extremely high, indicating an insulator.

Material B: Resistivity is 44×10^{-6} Ωm. This value is in the range of resistivities for alloys. Alloys have higher resistivity than pure metals but lower than insulators.

Material C: Resistivity is 1.62×10^{-8} Ωm. This is very low characteristic of a conductor.

(ii) Examples and Uses:

Material A (Insulator):

Example: Mica

Use in an electric stove/iron: Mica (or other insulating materials like ceramic, bakelite, etc.) is used for electrical insulation. It prevents the current from flowing to unintended parts of the appliance and protects users from electric shock. For example, it might be used to insulate the heating element from the metal casing of the appliance.

Material B (Alloy):

Example: Nichrome (an alloy of nickel and chromium)

Use in an electric stove/iron: Nichrome is used for the heating element. Its relatively high resistivity compared to pure metals allows it to get hotter when current passes through it. It also has a high melting point and does not oxidise easily at high temperatures, making it suitable for this application.

Material C (Conductor):

Example: Copper

Use in an electric stove/iron: Copper is used for the connecting wires because of its excellent conductivity. It allows the electric current to easily reach the heating element.

33. Decomposers are organisms that break down dead plants, animals and organic matter, converting them into simpler substances.

Examples: Bacteria (e.g., *Pseudomonas*, *Bacillus*), fungi (e.g., *Mushrooms*, *Molds*, *Yeasts*)

Functions help in maintaining ecological balance:

(i) Recycle nutrients: Break down organic matter into nutrients like carbon, nitrogen and phosphorus and return them to the soil, making them available for plants.

(ii) Waste removal: They prevent the accumulation of dead matter by cleaning up the environment.

SECTION – D

34. (A) Compounds A, B and C are

A: Ethyl alcohol or Ethanol - CH_3CH_2OH

B: Ethene: $CH_2=CH_2$ (Unsaturated compound)

C: Ethane: CH_3-CH_3 (Saturated compound)

C on combustion gives:

$CH_3–CH_3 + 7/2\ O_2 \rightarrow 2CO_2 + 3H_2O$

The chemical equation involves:

$CH_3CH_2OH \xrightarrow{\text{conc. } H_2SO_4} CH_2=CH_2 + H_2O$

$CH_2=CH_2 + H_2 \xrightarrow{Ni} CH_3\text{-}CH_3$

Role of H_2SO_4 – it acts as a dehydrating agent and removes water molecule to form ethene.

OR

(B) (i) A is acetic acid or ethanoic acid: CH_3-COOH

(ii) $CH_3\text{-}COOH + C_2H_5OH \xrightarrow{H_2SO_4} CH_3COOC_2H_5 + H_2O$

This is esterification and H_2SO_4 is used as a catalyst.

(iii) The process of obtaining compound A back from B is called hydrolysis of ester.

(iv) A can be obtained by oxidation of ethanol in the presence of oxidising agent $KMnO_4$ followed by acidification.

$$C_2H_5OH + 2[O] \xrightarrow{KMnO_2} CH_3COOH + H_2O$$

(v) Carbon dioxide gas is produced.

$$2CH_3COOH(aq) + NaCO_3(s) \rightarrow 2CH_3COONa(aq) + CO_2(g) + H_2O$$

35. (A) (i) (a) Many fully differentiated organisms possess the ability to generate new individuals from their body parts through regeneration. If an organism is cut or broken into multiple pieces, some of these fragments can develop into separate individuals.

Examples: (a) Hydra can regenerate its entire body from a small portion.

(b) Humans and other mammals (e.g., lions, elephants, dogs) do not show regeneration.

Reason: They have differentiated cells that lack the ability to divide and form new body parts.

(ii) The filamentous structures seen in the dark green water of a pond are algae, such as *Spirogyra*.

Methods of reproduction:

Fragmentation (Asexual Reproduction): The filament breaks into smaller fragments due to natural processes or external forces. Each fragment regenerates the missing parts through cell division and growth and develops into a complete organism.

(B) (i) (a) Vas deferens

(b) Testes

(c) Prostate and Seminal vesicles

(d) Scrotum

(ii) Characteristics of sperm:

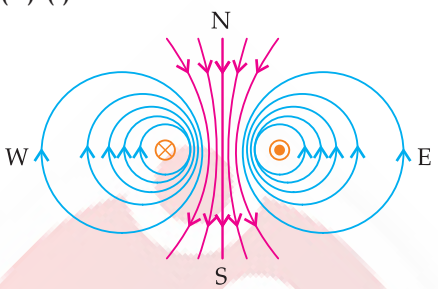
- Sperm cells are tiny and cannot be seen without a microscope.
- Sperm consists of a head (carries genetic material), a middle piece and a tail (for movement toward the female egg).

(iii) The surgical contraceptive methods are:

- Blockage of vas deferens in males
- Blockage of the fallopian tube in females

Side effect of this method: While these methods are effective and safe in the long run, improper surgery may lead to infections or complications.

36. (A) (i)



The direction of the magnetic field at O which is equidistant from the two conductors is North to South on the plane of the card board as shown in the figure.

(ii) (a) The three wires are:

- **Red:** Live wire (or Phase wire)
- **Black:** Neutral wire
- **Green:** Earth wire (or Ground wire)

(b) The potential difference between the red (live) wire and the black (neutral) wire is 220 V.

(c) The green earth wire provides a low-resistance path for current to flow to the ground in case of an electrical fault, such as a short circuit or leakage. If the live wire accidentally comes in contact with the metallic body of the appliance, the current flows through the earth wire to the ground instead of passing through a person who might touch the appliance. This prevents electric shock.

OR

(B) (i) (a) From the deflection of the conductor AB, when current flows through the conductor, it can be shown that a force is exerted on it.

(b) The direction of force can be reversed if:

- the direction of current-flowing through the conductor is reversed.
- the poles of the horseshoe magnet is interchanged.

(ii) The magnitude of the force is the highest when the direction of the current is at right angles to the direction of the magnetic field.

(iii) Fleming's Left-hand rule: Stretch the thumb, forefinger and middle finger of your left hand such that they are mutually perpendicular. If the first finger points in the direction of the magnetic field and the second finger in the direction of current,

then the thumb will point in the direction of motion or the force acting on the conductor.

SECTION – E

37. **(i)** Hydrochloric acid (HCl) and sodium hydroxide (NaOH) are used to obtain common salt (NaCl).

(ii) Sodium chloride (NaCl) is a neutral salt with a pH around 7 as it is made of strong acid (HCl) and strong base (NaOH).

(ii) **(A)** Brine solution (NaCl) undergoes electrolysis, causing the solution to decompose into chlorine gas at the anode and Hydrogen gas at the cathode, and sodium hydroxide remains in the solution.

$2NaCl\ (aq) + 2H_2O\ (aq) \rightarrow 2NaOH\ (aq) + Cl_2\ (g) + H_2\ (g)$

OR

(iii) **(B)** Cold and concentrated solution of sodium chloride saturated with ammonia is allowed to react with CO_2 to form sodium bicarbonate, which on heating gives sodium carbonate with the evolution of CO_2. When sodium carbonate reacts with water to form sodium carbonate decahydrate.

$NaCl + H_2O + CO_2 + NH_3 \rightarrow NaHCO_3 + NH_4Cl$

$2NaHCO_3 \xrightarrow{\Delta} Na_2CO_3 + CO_2 + H_2O$

$Na_2CO_3 + 10H_2O \rightarrow Na_2CO_3.10H_2O$

38. **(A)** **Action:** Reflex action

Definition: Reflex action is an automatic and immediate response to a stimulus without conscious thought, controlled by the spinal cord.

Role of Motor and Relay Neuron:

(a) **Motor Neuron:** Carries signals from the Central Nervous System (CNS) to the muscles, causing movement or response.

(B) **Relay Neuron:** Acts as a connector between sensory and motor neurons, transmitting signals within the spinal cord or brain.

Two Types of Nervous Systems:

(i) **Central Nervous System (CNS):** Includes the brain and spinal cord.

(ii) **Peripheral Nervous System (PNS):** Includes nerves that connect the CNS to the rest of the body, further divided into the somatic and autonomic nervous systems.

(b) **(a)** Thinking → Cerebrum

(b) Picking up a pencil → Cerebellum

(c) Controlling blood pressure → Medulla Oblongata

(d) Controlling hunger → Hypothalamus

39. **(i)** Another instance where a spectrum of white light is observed is in the formation of a rainbow. It is a natural example of a spectrum of white light which is formed when sunlight is refracted and dispersed by raindrops.

(ii) When white light falls on the tiny water droplets, they refract and disperse the incident sunlight, then reflect it internally, and finally refract it again when it comes out of the raindrop forming a rainbow.

(iii) **(A)** **Condition 1:** Rain

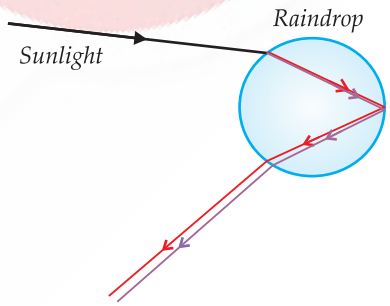
- Rain droplets act like prisms that disperse light into a spectrum of colours. Rainbows are more likely to occur after a rainstorm or in the midst of a waterfall.

Condition 2: Sun's position

- The sun must be behind the observer. The lower the sun is in the sky, the larger the arc of the rainbow will be.

OR

(iii) **(B)**



Delhi Set– 2 **31/4/2**

SECTION – A

8. Option (d) is correct.

Explanation: Germ cells (male sperm and female egg) contain half the number of chromosomes and DNA compared to non-reproductive body (somatic) cells.

17. Option (d) is correct.

Explanation: The statement "All exothermic reactions are accompanied by the evolution of heat and light" is false, as most of the exothermic reactions release heat and not light. The reason is correct.

SECTION – B

21. **Two safety measures are:**

(i) Always wear eye protection to avoid looking at the bright flame directly.

(ii) Use tongs to hold the magnesium ribbon to avoid intense heat and light.

Observations:

(i) The burning of magnesium in the air produces magnesium oxide (MgO).

$2Mg + O_2 \rightarrow 2MgO$

(ii) It is an exothermic chemical reaction in which bright light and heat are produced.

23. The small intestine is the primary site for absorption of digested food in the human alimentary canal. It is specifically adapted for this function and has the following features:

(i) **Large Surface Area –** The inner lining of the small intestine has numerous folds and projections called villi and microvilli, which increase the surface area for maximum absorption of nutrients.

(ii) **Rich Blood Supply –** The villi contain an extensive network of capillaries which help in the rapid transport of absorbed nutrients to different parts of the body.

24. **(i)** When a pure tall plant (TT) is crossed with a pure dwarf plant (tt), all offspring in the F_1 generation will have the Tt genotype. Since T (tall) is dominant over t (dwarf), all F_1 plants will express the tall phenotype and look similar.

(ii) In the F_2 generation, when F_1 plants (Tt) are self-pollinated, the trait combination is 1 TT (Pure Tall): 2 Tt (Hybrid Tall): 1 tt (Pure Dwarf). Hence, the ratio of pure-tall plants to pure-dwarf plants in the F_2 generation is 1:1.

26. **Role of an electric fuse:**

An electric fuse is a safety device that protects an electrical appliance from damage due to excessive current flow.

It is a thin wire of alloy of tin and lead, connected in series with the appliance. When the current exceeds a certain limit, the fuse wire melts due to the heat generated by the current (Joule heating). This breaks the circuit, preventing further current flow and protecting the appliance from damage.

A fuse has a specific current rating, which is the maximum current it can carry without melting. If a fuse with a larger rating is used, it will not melt even if the current exceeds the safe limit for the appliance. This can lead to overheating, appliance damage or fire hazards.

SECTION – C

28. **(i)** D is the least reactive metal.

(ii) From the table it is clear that C is more reactive than Fe because it gives a displacement reaction with $FeSO_4$. So, when C is added to $CuSO_4$ it will give a displacement reaction and copper gets reduced.

(iii) From the given data it is clear that B is the most reactive and D is the least reactive but there is no confirmation whether metal A or C is more reactive. If A does not react with $FeSO_4$ then C will be more reactive than A and the reactivity order will be:

B>C>A>D

29. **(i)** A - Pulmonary artery

B - Pulmonary vein

C - Aorta

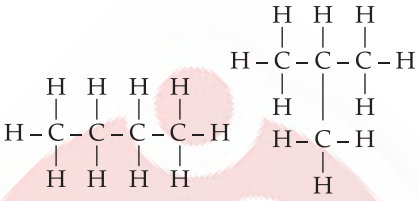
D - Vena cava

(ii) Pulmonary artery (A) carries deoxygenated blood from the right ventricle of the heart to the lungs for oxygenation.

The aorta (C) carries oxygenated blood from the heart to all parts of the body.

SECTION – D

34. **(A)** **(i)** Carbon compounds having the same molecular formula but different structural formulas are called structural isomers.



Butane C_4H_{10} Iso-Butane C_4H_{10}

Propane has no structural isomer because there is only one possible arrangement with three carbon atoms connected in a chain.

(ii) Butane undergoes a combustion reaction in the presence of air.

Chemical equation:

$2C_4H_{10}\,(g) + 13O_2\,(g) \rightarrow 8CO_2(g) + 10\,H_2O(g)$

Butane is a saturated hydrocarbon that burns with a clean flame, while butyne is an unsaturated hydrocarbon that burns with a yellow flame and produces a lot of black smoke.

OR

(B) **(i)** Atomic number of carbon is 6.

Electronic configuration is C- 2,4. It has 4 electrons in outermost valence shell. In order to get noble gas configuration, it needs 4 more electrons. Carbon is unable to form C^{4-} anion as its nucleus with six protons, cannot hold ten electrons.

It is not possible to lose or remove 4 electrons to form C^{4+} as it requires a huge amount of energy.

Due to this, carbon shares its valence electrons with other elements and forms covalent compounds.

(ii) A functional group is an atom or a group of atoms that is bonded to a carbon chain. It defines the chemical properties of the organic compound.

Compound	Structural formula	Functional group
Ethanol	CH_3CH_2OH	-OH (alcohol/hydroxyl)
Ethanoic acid	CH_3COOH	-COOH Carboxylic acid

Delhi Set– 3 **31/4/3**

SECTION – A

3. Option (b) is correct.

Explanation: No. of electron in third shell = 25% of the electrons present in the second shell. Mg-2,8,2

20. Option (b) is correct.

Explanation: White light is dispersed by a glass prism into seven colours (the visible spectrum). This is due to the phenomenon of dispersion. When white light passes through a prism, each colour is refracted (bent) at a slightly different angle. Red light has the longest wavelength and bends the *least*, while violet light has the shortest wavelength and bends the most.

SECTION – B

21. Silver Bromide (AgBr) is used in black and white photography. The reaction is endothermic because it absorbs energy from its surroundings in the form of light.

$$2AgBr + light \rightarrow 2Ag + Br_2$$

23. The xylem and phloem are the vascular tissues that form the vascular bundles.

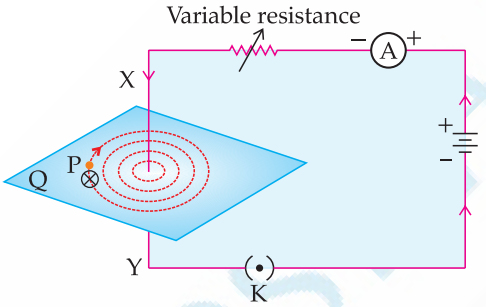
Xylem

- **Function:** Transports water and minerals from roots to different parts of the plant.

Phloem

- **Function:** Transports food (sugars) produced during photosynthesis from leaves to all parts of the plant.

26.

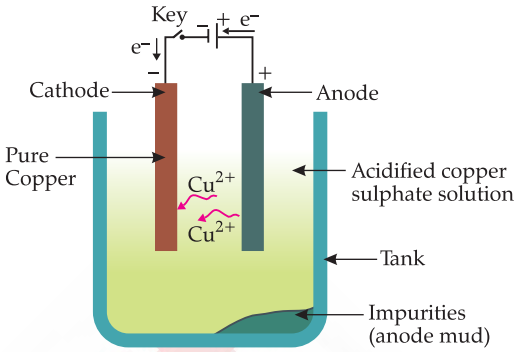


The rule that helps us to determine the direction of magnetic field lines in this case is Right-hand thumb rule, which states that

Imagine that you are holding a current-carrying straight conductor in your right hand such that the thumb points towards the direction of the current. Then your fingers will wrap around the conductor in the direction of the field lines of the magnetic field.

SECTION – C

28. The refining of metals can be done by electrolytic refining. Impure metal is made the anode in an electrolytic cell, and a strip of pure metal acts as a cathode, with a solution of the metal salt acting as an electrolyte. When an electric current is passed through this solution, the impure metal from the anode dissolves into the electrolyte and deposits on the cathode, leaving behind impurities as anode mud at the bottom of the cell.



29. The first step of cellular respiration is glycolysis.

It occurs in the cytoplasm of the cell.

Equation for the breakdown of glucose in a human cell:

(i) In presence of oxygen-

$$\text{Glucose} \xrightarrow{\text{Mitochondria}} \text{Pyruvate} + \text{Energy}$$

$$\text{Carbon dioxide} + \text{Water} + \text{Energy}$$

(ii) Due to lack of oxygen (absence of oxygen)-

$$\text{Glucose} \xrightarrow{\text{Mitochondria}} \text{Pyruvate} + \text{Energy}$$

$$\text{Lactic acid} + \text{Energy}$$

32. The potential difference between two points in an electric circuit carrying current is defined as the amount of work done to move a unit of positive charge from one point to the other.

Potential difference (V) between two points

= Work done Charge (W) / Charge (Q)

$$V = \frac{W}{Q}$$

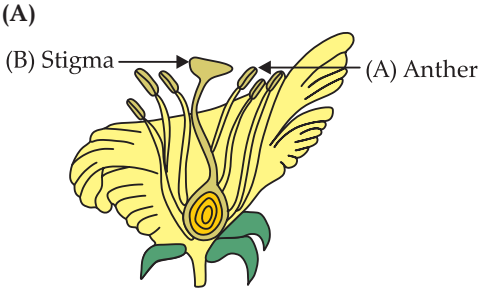
The SI unit of electric potential difference is volt (V).

One volt is the potential difference between two points in a current-carrying conductor when 1 joule of work is done to move a charge of 1 coulomb from one point to the other.

$$\text{Therefore, 1 volt} = \frac{1 \text{ joule}}{1 \text{ coulomb}}$$

$$1 V = 1 JC^{-1}$$

35. (A)



The following changes occur when pollen grains (product of B) reach the stigma (A):

(i) Pollination: Pollen grains from the anther (B) are transferred to the stigma (A) through wind, insects or other agents.

(ii) Germination of Pollen: Upon landing on the stigma, the pollen grain germinates, forming a pollen tube that extends through the style towards the ovary.

(iii) Fertilisation: The male gamete from the pollen grain travels through the pollen tube and fuses with the egg cell in the ovule inside the ovary.

(iv) Zygote Formation: The fertilised egg develops into a zygote, which later grows into an embryo.

(v) Seed and Fruit Development: The ovule matures into a seed, and the ovary enlarges to form the fruit.

(B) Changes After Fertilisation in the Female Reproductive System:

(i) Zygote Formation: The fertilised egg (zygote) undergoes multiple divisions and forms an embryo.

(ii) Implantation: The embryo travels to the uterus and implants itself into the uterus lining.

(iii) Preparation of Uterus: The uterine lining becomes thicker and is enriched with blood vessels to provide nourishment and support for the developing embryo.

(iv) Development of the Embryo: The implanted embryo grows and differentiates into a foetus.

Formation of Placenta: The placenta begins to develop to provide nutrients and oxygen to the embryo.

Growth of the Fetus: Over time, the embryo develops into a fetus, supported by the uterus and placenta.

Role of the Placenta:

(i) Facilitates the exchange of oxygen and nutrients from the mother's blood to the fetus.

(ii) Removes waste products like carbon dioxide from the fetal blood.

Fate of an unfertilised egg: The unfertilised egg disintegrates and the uterine lining, which was prepared for implantation, sheds off and comes out as blood and mucous through the vagina. This shedding leads to menstruation.

Outside Delhi Set– 1 **31/6/1**

SECTION– A

1. Option (c) is correct

Explanation: During the electrolysis process, water breaks down into its constituent gases, hydrogen and oxygen. The positively charged electrode (anode) attracts negatively charged ions and generates oxygen gas. The negatively charged electrode (cathode) attracts positively charged ions and generates hydrogen gas.

$2H_2O \rightarrow 2H_2 + O_2$

2. Option (d) is correct

Explanation: Ammonium chloride is acidic (pH<7)

Potassium nitrate is neutral (pH = 7)

Sodium carbonate is basic (pH>7)

3. Option (c) is correct

Explanation: It is an exothermic reaction, as Magnesium burns in the presence of oxygen and produces heat and light.

4. Option (c) is correct

Explanation: Option a, b and d belong to alkanes with the general formula C_nH_{2n+2} while option c belongs to alkenes with the general formula $C_nH_{2n.}$

5. Option (b) is correct

Explanation: $Fe + CuSO_4 \rightarrow FeSO_4 + Cu$

Iron (Fe) is more reactive than Copper (Cu), so it displaces copper and the blue colour of copper sulphate ($CuSO_4$) is changed into pale green due to the formation of ferrous sulphate ($FeSO_4$).

6. Option (d) is correct

Explanation: The presence of tartaric acid in tamarind juice makes it acidic and thus changes the colour of blue litmus to red.

7. Option (b) is correct

Explanation: Water of crystallisation is present in Plaster of Paris- $CaSO_4$ ½H_2O and Washing soda – $Na_2CO_3.10H_2O$

8. Option (d) is correct

Explanation: **Parent generation:** TTRR (tall and round) x ttrr (short and wrinkled)

Gametes: TR × tr

	TR	TR
tr	TtRr	TtRr
tr	TtRr	TtRr

F_1 generation: 100% TtRr (tall and round)

9. Option (d) is correct

Explanation: The pineal gland is located on the dorsal side of the forebrain. The hypothalamus lies at the base of the thalamus and is the basal part of the diencephalon, forebrain. The four parathyroid glands are present on the back side of the thyroid gland, one pair in each of the two lobes of the thyroid gland. The pituitary gland is located in a bony cavity called sella turcica at the base of the brain. The thymus gland is a lobular structure located between the lungs.

10. Option (c) is correct

Explanation: Leishmania reproduces through binary fission with a longitudinal plane of division, while Spirogyra undergoes fragmentation, breaking into pieces to grow. Planaria demonstrates regeneration, exhibiting the ability to regrow body parts and

Plasmodium, the malaria-causing parasite, reproduces via multiple fission.

11. Option (a) is correct

Explanation: The nephron is the functional unit of the kidney responsible for filtering blood and forming urine. The urethra is a tube that carries urine from the urinary bladder to the outside of the body. A neuron is a specialised cell that transmits electrical signals in the nervous system. The urinary bladder is a muscular sac that stores urine until it is excreted from the body.

12. Option (b) is correct

Explanation: The gastric glands secrete hydrochloric acid to aid digestion, pepsin for protein breakdown and mucus to protect the stomach lining. Bile is produced by the liver, not gastric glands. Lipase is secreted by the pancreas, not the gastric glands. Salivary amylase is secreted by salivary glands, not gastric glands.

13. Option (c) is correct.

Explanation: According to the ray diagram for mirrors, ray parallel to the principal axis incident on a concave mirror, passes through focus after reflection.

14. Option (d) is correct

Explanation: The pupil regulates and controls the amount of light entering the eye.

15. Option (d) is correct

Explanation: In a food chain, energy decreases as it moves up trophic levels, typically following the 10% energy transfer rule. This means that only about 10% of the energy is passed on to the next level, while the rest is lost as heat or used for metabolism.

Given that the energy available at the third trophic level (Frog) is 50 kJ:

From the third trophic level (Frog) to the second (Grasshopper), the energy would be 50 kJ/0.1 = 500 kJ.

From the second trophic level (Grasshopper) to the first (Grass), the energy would be 500 kJ / 0.1 = 5000 kJ.

So, the available energy at the producer level (Grass) was 5000 kJ.

16. Option (c) is correct

Explanation: Ozone is not commonly used as a refrigerant or in fire extinguishers due to its reactivity and toxicity. It is toxic in high concentrations. In the stratosphere, ozone absorbs harmful UV radiation from the Sun, protecting life on Earth. It forms when an oxygen molecule (O_2) reacts with a free oxygen atom (O) in the atmosphere.

17. Option (a) is correct.

Explanation: Carbon fuels like coal and oil are used because burning them releases a lot of energy. That energy, in the form of heat and light, makes them effective as our main power sources.

18. Option (c) is correct

Explanation: Xylem tissue is responsible for transporting water and dissolved minerals from the roots to other parts of the plant. Reason (R) is false. Xylem tissue is not only found in the roots. It is present throughout the plant, including in the stems and leaves, where it continues transporting water and minerals to various parts of the plant.

19. Option (a) is correct.

Explanation: Earth wire is connected to a metallic plate buried deep inside the earth.

The potential of the earth is zero, so the potential of the earth wire also becomes zero. Thus, the assertion is true..

The metallic body of an electrical appliance is connected to this earth wire. Any accidental leakage current now gets an easy path to flow to the earth through this wire without flowing through the user's body. Hence, the user does not get a shock. So, the reason is also true and it explains the assertion.

20. Option (c) is correct

Explanation: Assertion (A) is true. A food web consists of multiple interconnected food chains within an ecosystem, where various species can be part of more than one food chain. It represents the complex feeding relationships in an ecosystem. Reason (R) is false. A food web increases an ecosystem's stability because multiple interconnected food chains make the ecosystem more resilient to disturbances. If one food chain is disrupted, other chains can continue to function, helping maintain balance.

SECTION – B

21. P = Iron (Fe)

Q = Aluminium (Al)

$2Al + 3FeSO_4 \rightarrow Al_2(SO_4)_3 + 3Fe$

Aluminium is more reactive than iron, so it displaces iron and thus green colour of iron sulphate disappears due to the formation of aluminium sulphate.

22. **(a)** The brain is protected by the skull (cranium) and three protective layers known as meninges. Additionally, cerebrospinal fluid (CSF) acts as a cushion, protecting the brain from shocks.

(b) The hindbrain is the region of the brain responsible for maintaining posture and balance. Specifically, the cerebellum is part of the brain that controls body posture and balance.

23. **(a)** Proteins are encoded by genes and play a crucial role in determining various traits. Proteins act as enzymes or assist in the formation of a hormone which in turn regulates a specific function. For example, in tall plants, the gene responsible for height produces a protein that regulates growth hormones, such as gibberellins, to control the plant's growth and height.

OR

(b) In sexually reproducing organisms, the process of gamete formation by meiosis followed by the fusion of gametes during fertilisation ensures DNA stability. During gamete formation by meiosis, each gamete receives one chromosome from each pair, either maternal or paternal. Upon fertilisation, the two gametes fuse, restoring the full set of chromosomes in the offspring. This mechanism preserves the integrity of the species' DNA and ensures the transfer of genetic information to future generations.

24. (a) Medium 2 is the rarer medium. Hence, the speed of light is higher in medium 2.

(b) Medium 2 is rarer compared to medium 1 and the speed of light in medium 2 is greater than in medium 1. Hence, the light ray in medium 2 bends away from the normal.

(c) If v_1 and v_2 are the speed of light in medium 1 and medium 2 respectively, then the refractive index of medium 2 w.r.t. medium 1 is v_1/v_2.

25. (a) (i) At very high altitudes, there is no atmosphere. Hence, no scattering takes place there.

So, the sky appears dark to passengers flying at very high altitudes.

(ii) Red colour has the longest wavelength in the visible range. Hence it scatters the least in the air and travels the farthest through fog and rain. Hence, it is used as a danger signal.

OR

(b) A rainbow is a natural optical phenomenon that appears as a multi-coloured arc in the sky, typically after a rainfall. It occurs when sunlight is refracted, at two points and reflected (total Internal reflection), and dispersed by water droplets in the atmosphere.

26. Natural ponds and lakes do not require regular cleaning because these are self-sustaining ecosystems and include decomposers, such as bacteria, fungi, and other microorganisms. These decomposers break down organic matter, such as dead plants, animals, and other waste, turning it into simpler substances. This process recycles nutrients, such as nitrogen, phosphorus and carbon, back into the ecosystem, helping maintain water quality and balance. Additionally, plants and algae in these water bodies absorb excess nutrients, keeping the environment stable.

In contrast, aquariums or swimming pools do not have decomposers. Without the presence of decomposers and a balanced ecosystem, waste from fish, uneaten food and other organic materials accumulate in the water. So, regular cleaning and water changes are necessary to remove waste and maintain water quality.

SECTION – C

27. (a) $3Fe + 4H_2O \xrightarrow{Heat} Fe_3O_4 + 4H_2$

(b) $CH_4 + 2O_2 \rightarrow CO_2 + 2H_2O$

(c) $C_6H_{12}O_6 + 6O_2 \rightarrow 6CO_2 + 6H_2O$+Energy (ATP)

28. (a) (i) Baking soda is used as an antacid because of its alkaline nature. It readily neutralises excess acid present in the stomach.

(ii) alkaline nature

(iii) ability to react with acids to produce carbon dioxide gas

OR

(b) (i) $Zn + 2HCl \rightarrow ZnCl_2 + H_2$

Main product is zinc chloride.

(ii) $HCl + NaOH \rightarrow NaCl + H_2O$

Main product is sodium chloride (common salt).

(iii) $Na_2CO_3 + 2HCl \rightarrow 2NaCl + H_2O + CO_2$

Main product is sodium chloride (common salt).

29. (i) Pulmonary Vein: It is the blood vessel that brings oxygenated blood to the human heart. It brings the blood from the lungs to the heart.

(ii) Vena Cava: It is the blood vessel that brings deoxygenated blood to the human heart. It brings the blood from all the body parts to the heart.

Chamber of the heart which receives the deoxygenated blood: Right atrium.

The deoxygenated blood from the right atrium enters the right ventricle through the tricuspid valve. The pulmonary artery carries deoxygenated blood from the right ventricle of the heart to the lungs for oxygenation. In the lungs, the blood is oxygenated and returns to the heart through the pulmonary veins.

30. (a) Two observations made by Mendel in F_1 plants:

- All the plants in the F_1 generation had purple flowers, which showed that the purple flower trait was dominant over the white flower trait.
- There was no segregation of the white flower trait in the F_1 generation, as all F_1 plants exhibited the dominant purple flower trait.

(b) Parent plants: WW (purple) x ww (white)

F_1 generation: Ww (purple)

F_2 generation: Ww x Ww

Gametes: W and w

	W	W
W	WW	Ww
W	Ww	Ww

(i) The percentage of white-flowered plants (ww)= 25%

(ii) In the F_2 generation (produced by self-crossing the F_1 generation, which was all Ww):

The genotypic ratio = 1 WW: 2 Ww: 1 ww.

(c) Difference between dominant and recessive traits:

A dominant trait is expressed in the phenotype even if only one copy of the dominant allele is present (e.g., W for purple flowers).

A recessive trait is expressed only when both alleles are recessive (e.g., ww for white flowers).

31. **(a)** Focal length of the convex lens used is 15 cm.

Reason: From the observation no. 4 of the observation table,

Object distance = Image distance = 30 cm.

This is possible only when the object is placed at the centre of curvature.

So, the radius of curvature = R = 30 cm.

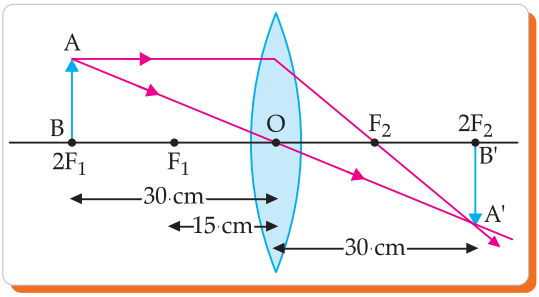
Hence, the focal length of the lens = f = R/2 = 15 cm.

(b) Observation no. 8 is not correct.

Reason 1: When the object distance is less than the focal length, then the image formed by a convex lens is virtual and appears on the same side as the object. Therefore, the image distance should also be negative.

Reason 2: In observation no. 8, the object distance is less than the focal length of the lens but the image distance is positive, i.e., a real image on the other side of the lens is formed. This cannot happen.

(c) Ray diagram corresponding to observation no. 4:



32. **(a)** Hypermetropia.

(b) The causes of hypermetropia:

(i) the focal length of the eye lens is too long, or

(ii) the eyeball has become too small.

(c) P in Dioptre = $\frac{1}{f}$ in metre

Or, 2D = $\frac{1}{f}$ in metre

f = ½ m = 50 cm

33. **(a)** The potential difference between two points is 1V means that1 Joule of work is required to be done to move 1 Coulomb of charge from one point to the other.

(b) **Symbol (i):** It is the symbol of an ammeter. It is used to measure the current in a circuit.

Symbol (ii): It is the symbol of a variable resistor and used to control the flow of current in a circuit and hence the voltage across a certain component.

SECTION – D

34. **(a)** Ethyl (Ethanol) Alcohol: C_2H_5OH

Ethanoic acid: (Acetic acid) CH_3COOH

Alcohols can be converted to acetic acid by the oxidation process.

$$\underset{\text{Ethanol}}{CH_3-CH_2OH} \xrightarrow{\text{Oxidation}} \underset{\text{Acetaldehyde}}{CH_3-\overset{\overset{H}{|}}{C}=O}$$

$$\xrightarrow{\text{Oxidation}} \underset{\text{Acetic acid}}{CH_3-\overset{\overset{OH}{|}}{C}=O}$$

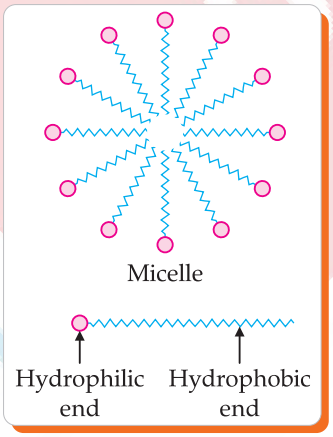
The two compounds i.e., ethanoic acid or acetic acid and ethanol react to form ester – ethyl ethanoate.

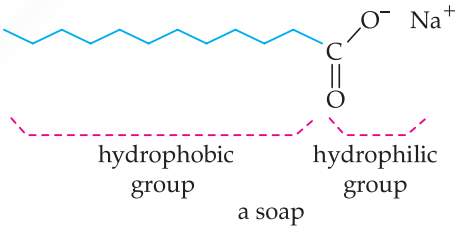
$$\underset{\text{Ethanoic acid}}{CH_3COOH} + \underset{\text{Ethanol}}{C_2H_5OH} \xrightarrow{\text{conc. } H_2SO_4} \underset{\text{Ethyl ethanoate}}{CH_3COOC_2H_5} + \underset{\text{water}}{H_2O}$$

OR

(b) The sodium or potassium salts of the long-chain carboxylic acids are referred to as soaps. It consists of a long hydrocarbon chain having carboxylic acid on one end. This has an ionic bond with metal ions which is usually sodium or potassium.

Structure of soap:





This is the structure of the soap molecule - sodium stearate. It has a hydrophilic and hydrophobic part in it. The hydrophobic end is non-polar and insoluble in water. In the above molecule, the hydrophobic part is - $C_{17}H_{35}$. The hydrophilic end is polar and soluble in water. In the molecule, the hydrophilic end is – COONa.

Micelles is the name of soap molecules. The hydrophobic end is attached to the dust, oil, grease, dirt or materials which we want to remove, detaching takes place, gets suspended in water and can easily be removed.

When dirt is put in water containing soap, then the non-polar end of soap in a micelle attaches to an oil particle present on the surface of the dirt. The soap micelles trap the oily particles by the non-polar end. The polar end attaches to the water when the dirt is agitated in soap solution.

Soaps cannot be used in hard water because of its tendency to form precipitates with the calcium and magnesium salts which are present in hard water. This formation of precipitate results in prevention of the formation of lather in soap water.

To overcome this problem detergents can be used which are ammonium or sulphonate salts of fatty acids.

35. **(a)** Puberty is a time of rapid physical growth and sexual maturity that occurs during adolescence.

Changes in boys:

Growth of Facial and Body Hair: Boys start growing facial hair (moustache and beard) and body hair (underarms, chest and pubic hair).

Deepening of Voice: The voice box (larynx) grows, causing the voice to become deeper.

(b) The testes are located in the scrotum outside the body to maintain a temperature that is slightly lower than the normal body temperature. This cooler temperature is essential for the proper production and storage of sperm.

(c) **Three contraceptive techniques used by humans:**

(i) **Barrier methods:** Condoms are the barrier methods worn during intercourse.

(ii) **Intrauterine devices (IUDs):** A device placed in the uterus to prevent pregnancy, used by females.

(iii) **Surgical methods:** Vasectomy is a surgical procedure for males in which the vas deferens (the tube that carries sperm) are cut or sealed to prevent the release of sperm during ejaculation. Tubectomy is a surgical procedure for females in which the fallopian tubes are cut or sealed to prevent the egg from reaching the uterus, preventing fertilisation.

Among these, IUDs are not used by males.

OR

(a) **(i)** **Production of eggs:** Ovaries

(ii) **Site of fertilisation:** Oviducts (fallopian tubes)

(iii) **Site of implantation:** Uterus

(iv) **Entry of sperms:** Vagina

(b) **Change observed in the uterus:**

(i) **After implantation of a zygote**

- The uterine lining thickens to support to developing embryo.
- The uterine lining is richly supplied with blood vessels so that nutrition and oxygen can be supplied to the developing foetus.

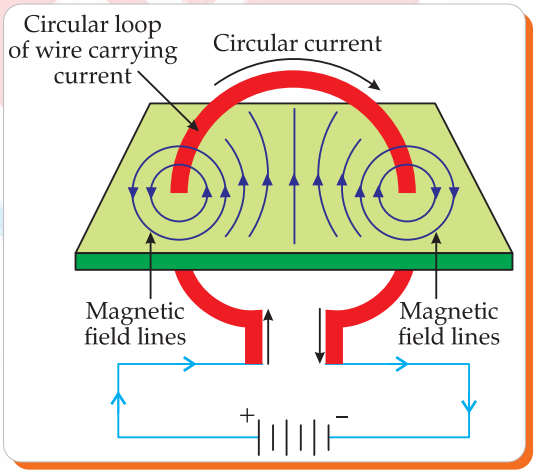
(ii) **if an egg is not fertilised**

When the egg is not fertilised, it is shed from the body, and the menstrual cycle occurs. Every month, the ovary releases one egg. Simultaneously, the uterus prepares to receive a fertilised egg by thickening its endometrial lining, making it spongy and nourishing to support the embryo. If fertilisation does not occur, this lining breaks down, leads to the discharge of blood and mucus through the vagina. The menstrual cycle typically lasts for 5 to 7 days, during which the endometrial lining along with blood is expelled from the body.

36. **(a)** Magnetic field lines are the imaginary lines in a magnetic field, the tangent drawn at any point which gives the direction of the field at that point and its density gives the magnitude of the field.

The direction of a magnetic field at any point is determined by placing a small compass needle at that point, where the north pole of the needle will indicate the direction of the magnetic field.

Magnetic field produced by a current-carrying circular loop:



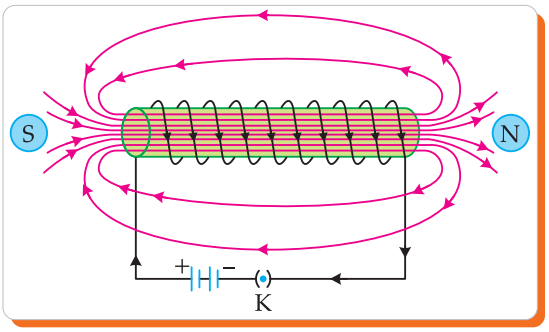
Factors on which the magnitude of the magnetic field due to a current-carrying coil depends:

(i) Magnitude of the current, **(ii)** Number of turns in the coil.

OR

(b) Two magnetic field lines cannot cross each other because if they do so, then it indicates two directions of the same magnetic field at that point which is not possible.

Magnetic field lines due to a current-carrying long straight solenoid:



Inside the solenoid, the field lies straight. Those are close and parallel to one another, indicating that the field inside the solenoid is very strong and uniform. Factors on which the magnitude of the magnetic field due to a current-carrying coil depends:

(i) Magnitude of the current, **(ii)** Number of turns per unit length in the solenoid.

SECTION – E

37. (I) An alloy generally has a lower melting point and lower electrical conductivity compared to its constituent metals.

(II) Soldering wire is an alloy of lead and tin which is used to join electrical wires in an electric circuit.

(III) (a) An alloy is a combination of two or more metals or a metal and a nonmetal. Brass is an alloy of copper and zinc.

OR

(III) (b) Stainless steel is a corrosion-resistant alloy of iron, chromium and nickel. It is made by melting iron, chromium and nickel in an electric furnace.

Stainless steel is more useful for making cooking utensils because it has excellent properties like corrosion resistance, durability and non-reactive nature with food.

38. (I) X: Geotropism

Y: Phototropism

(II) (i) Hormone responsible for falling of leaves: Abscisic Acid (ABA).

(ii) Hormone responsible for cell division: Cytokinin

(III) (a) Leaves of *Mimosa pudica* are sensitive. When touched the stimulus reaches the base of the leaf and the water in the vacuoles of the cells of the leaf loses water to the adjacent cell. All the water escapes the leaf which then becomes flaccid. This causes the leaves to close due to the passing of impulse which changes turgor pressure. Owing to this stimulus, the turgor of the lower half of the pulvinus is lost and the leaf droops down.

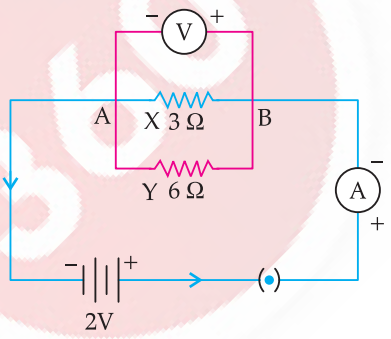
The stimulus is transmitted as an action potential from a stimulated leaflet to the leaflet's swollen base, and from there to the pulvini of the other leaflets, which run along the length of the leaf's rachis. The action potential then passes into the petiole, and finally to the large pulvinus at the end of the petiole, where the leaf attaches to the stem.

OR

(III) (b) Plant growth hormone synthesised in shoot tips: Auxin.

During the presence of sunlight, the auxins in the stem start moving toward the area that is away from light. Thus, the auxin concentration in this region increases due to which growth takes place. Whereas the area of low auxin concentration exhibits no growth. This results in the bending of the stem towards sunlight.

39. (I)



(II) (i) When the resistors are connected in parallel, then the potential difference across

X and Y for both the resistors will be the same.

(ii) When the resistors are connected in series, then the current through both the resistors connected across X and Y will be the same.

(III) (a) In the series combination, the current drawn

$$(I) = \frac{V}{R_1 + R_2} = \frac{2}{3+6} = \frac{2}{9}A$$

OR

(III) (b) In parallel combination, the equivalent resistance

$$(R) = \frac{X \times Y}{X + Y} = \frac{3 \times 6}{3+6} = 2\Omega$$

Outside Delhi Set– 2 **31/6/2**

2. Option (d) is correct

Explanation: The washing soda is sodium carbonate decahydrate.

6. Option (c) is correct

Explanation: When potassium nitrate dissolves in water, it splits into potassium and nitrate ions that does not change the pH, so the solution remains neutral.

8. Option (a) is correct

Explanation: The Parent (P) generation consists of the two organisms that Mendel initially crossed in his experiments. These organisms were purebred for particular traits. The F_1 generation is the first generation of offspring resulting from the cross of the

parent generation. In Mendel's experiments, the F_1 generation plants were all hybrids. The F_2 generation is produced by crossing two F_1 generation plants with each other. In Mendel's experiments, he allowed the F_1 plants to self-pollinate, which gave rise to the F_2 generation. Mendel did not obtain the F_2 generation by cross-pollination.

10. Option (d) is correct

Explanation: Plumule is the young shoot of a seed that develops into the stem and leaves. Radicle refers to the part of the seed that develops into the root. The stem is the main supportive structure of a plant, responsible for transporting water, nutrients and food. Cotyledons refer to the seed leaves that provide nutrients to the developing plant during germination.

14. Option (d) is correct

Explanation: When light enters the eye, it bends mainly at the front surface of the cornea because there's a big change in how fast light travels from air to the cornea, much like how a straw looks bent in a glass of water.

16. Option (d) is correct

Explanation: Green plants occupy the first trophic level in each food chain because they are autotrophic, meaning they can produce their own food through photosynthesis. By using sunlight, carbon dioxide and water, they create glucose and oxygen, making them the primary producers. These plants form the base of the food chain, providing energy for herbivores (the next trophic level) and ultimately supporting the entire ecosystem.

The presence of plants over a large area does not place them at the first trophic level. The use of chemicals in agriculture has increased the concentration of harmful chemicals in plant-based food items.

21. Cinnabar is an ore of mercury. Hence, metal X is Hg.

$2HgS + 3O_2 \rightarrow 2HgO + SO_2$

$2HgO \rightarrow 2Hg + O_2$

26. In a food chain, energy flows from one trophic level to the next, starting with producers (green plants) that capture solar energy through photosynthesis. The energy is then passed to primary consumers (herbivores), followed by secondary consumers (carnivores), and then tertiary consumers at higher levels.

The flow of energy is unidirectional because energy decreases at each successive trophic level due to energy loss in the form of heat, metabolism, and movement. This energy loss prevents the energy from flowing backwards, ensuring that it only moves from producers to consumers.

28. (a) (i) In solution D, the concentration of H^+ is maximum and in B, the concentration of OH^- is maximum.

(ii) D can be HCl and B can be NaOH

(iii) $HCl + NaOH \rightarrow NaCl + H_2O$

When HCl and NaOH are mixed in equal proportion, they undergo a neutralisation reaction.

OR

(b) (i) Hydrogen gas

$Zn + 2HCl \rightarrow ZnCl_2 + H_2$

Test for hydrogen

- Place a burning splint near the top of a test tube containing the gas.
- If the gas is hydrogen, it will react with oxygen and produce a loud "squeaky pop" sound.

(ii) (1) $Zn + 2HCl \rightarrow ZnCl_2 + H_2$ (Zinc chloride)

(2) $Zn + 2NaOH \rightarrow Na_2ZnO_2 + H_2$ (Sodium zincate).

29. Lens formula:

$$\frac{1}{v} - \frac{1}{u} = \frac{1}{f}$$

Or, $\frac{1}{v} + \frac{1}{30} = \frac{1}{20}$

$\therefore \quad v = 60$ cm

The image will be formed at a distance of 60 cm from the optical centre of the lens on the other side of the object.

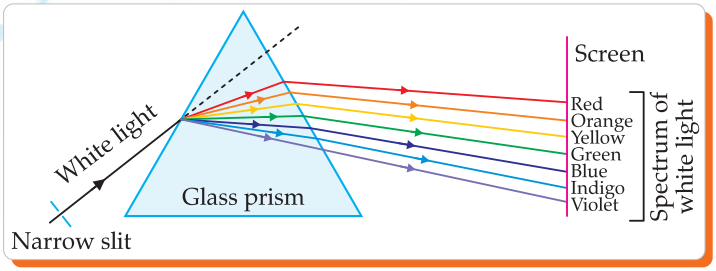
Magnification $= \frac{h_i}{h_o} = \frac{v}{u}$

Or, $\frac{h_i}{5} = -\frac{+60}{-30}$

$\therefore \quad h_i = -10$ cm

So, the image is inverted and enlarged in size.

33. (a) Dispersion of white light by a glass prism:

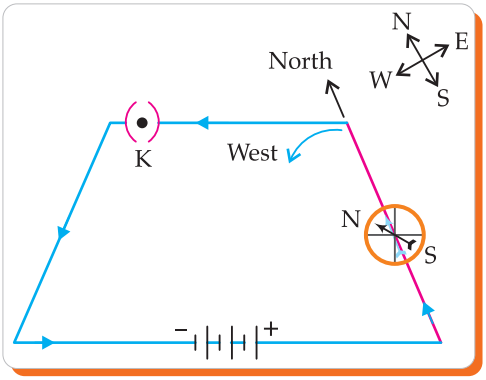


(b) Spectrum: When a white light is passed through a prism or similar device then it disperses into its constituent colors, is called the spectrum of the composite light.

The reason for the formation of a spectrum is that the constituent colours of a composite light travel at different speeds within the glass, causing them to refract at different angles, that appears into a visible band of colours.

36. (a) (i) The diagram shows that a magnetic needle is placed in the vicinity of a conductor carrying current from south to north and the north pole of the needle gets deflected towards east.

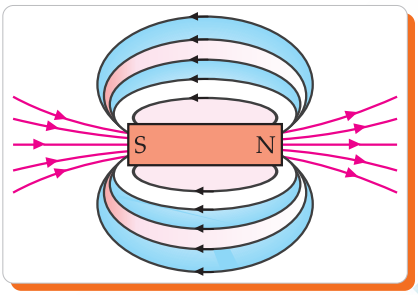
(ii) If the direction of the current is reversed, the north pole of the needle will get deflected towards the west.



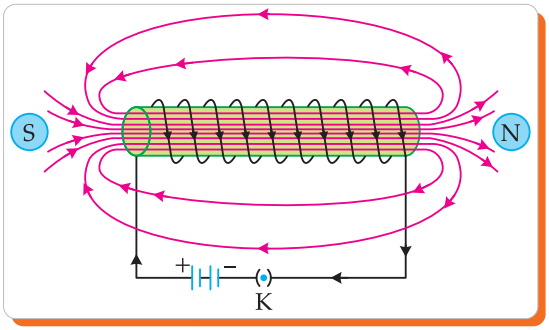
(b) Right-hand thumb rule.

OR

(b) (i) Magnetic field lines of a bar magnet:



(ii) Magnetic field lines due to current-carrying solenoid:



Distinguishing features between two magnetic fields:

- A bar magnet has a permanent magnetic field, while a solenoid creates a magnetic field only when current flows through it.
- Field strength of a bar magnet is fixed while the field strength of a solenoid depends on the current strength.
- The direction of the field of a bar magnet is fixed while the direction of the field of a solenoid can be reversed by reversing the direction of current.

(b) Force experienced by a moving charged particle in a magnetic field is qvBsinθ.

(i) (A) Since, $\theta = 90°$, so, the force experienced is maximum i.e. qvB.

(B) Since, $0° < \theta < 90°$, the force is greater than 0 but less than qvB.

(ii) (c) Since, $\theta = 180°$, so, the force experienced is 0.

Outside Delhi Set– 3 31/6/3

1. Option (b) is correct

Explanation: In these reactions, compounds are decomposed by heating.

3. Option (a) is correct

Explanation: aluminium, when exposed to air, develops a thin layer of aluminium oxide (Al_2O_3) which acts as a protective layer against further corrosion.

8. Option (b) is correct

Explanation: In a neuron, the dendrites receive signals from other neurons or stimuli. This signal is then transmitted to the cell body (soma), where it is processed. If the signal is strong enough, it travels along the axon as an action potential. Finally, the impulse reaches the nerve endings (axon terminals), where it triggers the release of neurotransmitters to pass the signal to the next neuron or effector cell. This process ensures rapid communication within the nervous system.

11. Option (b) is correct

Explanation: When plants produce glucose through photosynthesis, they use it immediately for energy or growth. Any excess glucose is converted into starch and stored in various parts of the plant, such as in the roots, tubers, seeds, or stems. Starch acts as an energy reserve that the plant can break down into glucose when needed, particularly during periods when photosynthesis is not occurring.

Plants release carbon dioxide as a by-product in the process of respiration. Other waste products of plants include tannins, alkaloids, resins, latexes, gums as well as the dead cells.

13. Option (d) is correct.

Explanation: When looking at objects at different

distances, the curvature of the human eye lens changes which is controlled by the ciliary muscles. When viewing distant objects, the muscles relax, lens curvature increases and while viewing nearby objects the muscles contract, lens curvature decreases and thus the image is focused on the retina.

15. Option (b) is correct

Explanation: The biodegradable wastes decompose through natural processes while the non-biodegradable wastes do not decompose easily by nature. Empty medicine bottles, milk packets and aluminium cans are examples of non-biodegradable wastes. Leather footwear, used tea leaves and newspaper are biodegradable wastes.

21. (i) Platinum

(ii) Aluminium

Aluminium is present in the elements present at the top of the activity series while platinum is present at the bottom of the series.

26. Green plants capture only about 1% of the total sunlight energy that reaches them and convert it into food energy through photosynthesis. This energy is stored in the form of glucose, which serves as the plant's food.

When primary consumers (herbivores) eat these plants, the energy stored in the plant is transferred to them. However, only a small fraction of this energy (around 10%) is passed on to the next trophic level (the primary consumer). The rest of the energy is lost in the form of heat, used for the consumer's metabolic processes, or excreted as waste. This is why energy flow through the food chain is inefficient, and it decreases as it moves up the trophic levels.

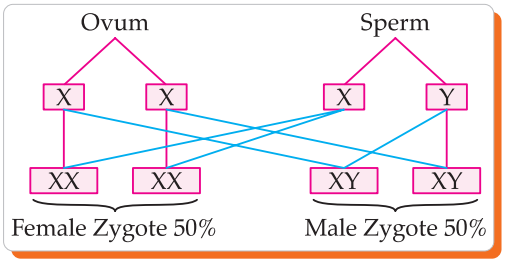
27. Respiration is considered an exothermic reaction because it releases energy in the form of heat. During respiration, glucose (or other organic molecules) is broken down in the presence of oxygen to produce carbon dioxide, water and energy. The energy released is used by the organism for various functions like movement, growth and maintaining body temperature.

The chemical equation for respiration is:

$C_6H_{12}O_6 + 6O_2 \rightarrow 6CO_2 + 6H_2O$ + Energy (ATP).

30. (a) In humans, sex is determined by genetic inheritance. The genes passed down from the parents decide whether the offspring will be male or female. Humans have two sex chromosomes: X and Y. Males contribute an XY combination, while females contribute an XX combination. If a sperm carrying an X chromosome fertilises an egg with an X chromosome, the result will be a girl. If a sperm carrying a Y chromosome fertilises an egg with an X chromosome, the result will be a boy.

Flow Diagram:



(b) Different species use various strategies to determine the sex of a newborn, which can either be influenced by environmental cues or genetically determined.

Environmental Cues: (a) In some animals, the temperature at which fertilised eggs are incubated determines whether the developing embryo becomes male or female. For example, in certain species of lizards, temperature plays a key role in sex determination, high incubation temperature results in male offspring in lizards. (b) In some animals, such as snails, individuals can change their sex in response to environmental stress or changes in their surroundings.

32. (a) Defect of vision: The defect of vision is myopia, also known as near-sightedness.

(b) Two causes of myopia:

- **Excessive length of the eyeball:** When the eyeball is too long, the light entering the eye focuses before it reaches the retina, causing distant objects to appear blurry.
- **Too strong a curvature of the cornea or lens:** If the lens or cornea is too curved, the light is focused in front of the retina instead of directly on it, resulting in blurred vision for distant objects.

(c) Focal length of the lens: The power (P) of a lens is related to its focal length (f) by the formula:

$$P = \frac{1}{F}$$

By rearranging the formula:

$$F = \frac{1}{P}$$

Here, f is the focal length of the lens in metres (m)

Given that the power of the lens is –0.5 D, we can calculate the focal length *f* as follows:

$$f = \frac{1}{P} = \frac{1}{-0.5} = -2\text{m}$$

35. (a) Method of reproduction in Amoeba and leishmania: Binary fission

Difference: In Amoeba, binary fission occurs randomly, with the cell dividing in any plane. In Leishmania, binary fission occurs in a fixed orientation relative to its whip-like flagellum, ensuring the daughter cells maintain proper positioning of the flagellum.

(b) Asexual reproduction: It is a type of reproduction where a single organism produces offspring without

the fusion of gametes. The offspring are genetically identical to the parent. Common methods of asexual reproduction include binary fission, budding and fragmentation.

Budding in Hydra: In Hydra, a small bud develops as an outgrowth from the body of the parent. This bud gradually grows, eventually detaching from the parent to form a new individual. The new organism is genetically identical to the parent, making it an example of asexual reproduction.

(c) Methods of Vegetative Propagation in Rose and Jasmine Plants:

Cutting: In this method, a portion of the stem or branch is cut and planted in the soil. It grows into a new plant and commonly used in rose and jasmine propagation.

Layering: In this method, a branch or stem of the plant is bent to the ground and covered with soil while still attached to the parent plant. Over time, roots form at the buried part, and the new plant can be separated from the parent. This is also used for propagating rose and jasmine plants.

OR

(a) Functions of each part of a bisexual flower:

(i) Petals: The petals attract pollinators such as insects, birds, or wind by being colourful and often fragrant, helping in the process of pollination.

(ii) Anther: The anther produces and releases pollen, which contains male gametes (sperm cells) required for fertilisation.

(iii) Style: The style is a tube-like structure that connects the stigma to the ovary, allowing the pollen tube to grow down to reach the ovule for fertilisation.

(iv) Ovary: The ovary contains the ovules, which are female gametes. After fertilisation, the ovary develops into the fruit and the ovules become seeds.

(b) Examples of unisexual and bisexual flowers

Unisexual flower example: Cucumber (male and female flowers are separate).

Bisexual flower example: Rose (has both male and female reproductive organs in the same flower).

Changes after fertilisation:

The ovule develops into a seed while the ovary develops into a fruit. The style and stigma typically wither away after fertilisation and he fertilised egg within the ovule becomes the embryo of the seed.

■■