Class X Session 2023-24
Subject - Science
Sample Question Paper - 10

Time Allowed: 3 hours **Maximum Marks: 80**

General Instructions:

1. This question paper consists of 39 questions in 5 sections.
2. All questions are compulsory. However, an internal choice is provided in some questions. A student is expected to attempt only one of these questions.
3. Section A consists of 20 objective-type questions carrying 1 mark each.
4. Section B consists of 6 Very Short questions carrying 02 marks each. Answers to these questions should be in the range of 30 to 50 words.
5. Section C consists of 7 Short Answer type questions carrying 03 marks each. Answers to these questions should be in the range of 50 to 80 words.
6. Section D consists of 3 Long Answer type questions carrying 05 marks each. Answers to these questions should be in the range of 80 to 120 words.
7. Section E consists of 3 source-based/case-based units of assessment of 04 marks each with sub-parts.

Section A

1. The chips packet is flushed with a gas **X** to prevent rancidity. Identify **X**. **[1]**

a) Oxygen b) Carbon dioxide

c) Nitrogen d) Water vapour

2. Strong heating of ferrous sulphate leads to the formation of a brown solid and two gases. This reaction can be categorised as: **[1]**

a) displacement and redox b) displacement and endothermic

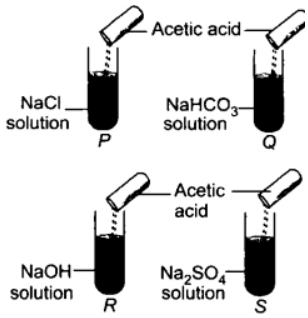
c) decomposition and exothermic d) decomposition and redox

3. Which of the following is used for dissolution of gold? **[1]**

a) Aqua regia b) Sulphuric acid

c) Hydrochloric acid d) Nitric acid

4. In which of the following test tubes effervescence will be observed? **[1]**



a) Q b) P

c) R d) S

5. Aqueous solutions of zinc sulphate and iron sulphate were taken in test tubes I and II by four students A, B, C and D. Metal pieces of iron and zinc were dropped in the two solutions and observations made after several hours were recorded in the form of table as given below: **[1]**

Student	Metal	Solution	Colour change of solution	Deposit/Coating obtained
A	Fe	$ZnSO_4$	Turned green	Silvery grey coating
	Zn	$FeSO_4$	No change	No change
B	Fe	$ZnSO_4$	No change	Black deposit
	Zn	$FeSO_4$	Colour faded	Grey coating
C	Fe	$ZnSO_4$	No change	No change
	Zn	$FeSO_4$	Turned colourless	Black deposit
D	Fe	$ZnSO_4$	No change	Grey deposit
	Zn	$FeSO_4$	No change	Black deposit

The correct reporting has been made in observations:

a) Student A b) Student C

c) Student D d) Student B

6. Which one of the following is non metal? **[1]**

a) Al b) Fe

c) N d) Zn

7. An organic compound A of molecular formula C_2H_6O on oxidation gives an acid B with the same number of carbon atoms in the molecule as A. Compound A is used for sterilization of skin by doctors. Name the compounds A and B. **[1]**

a) Compound A isC_2H_5OH nd B is CH_3CHO b) Compound A is CH_3OCH_3 and B is CH_3COOCH_3

c) Compound A is C_2H_5OH and B is CH_3COOH d) Compound A is CH_3COOH and B is C_2H_5COOH

8. Which of the following does not respire through the lungs? **[1]**

a) Duck b) Frog

c) Whale d) Tadpole

9. Select the group which shares maximum number of common characters- **[1]**

a) two genera of a family b) two individuals of a species

c) two species of a genus
d) two genera of two families

10. Chlamydia is related to: **[1]**

a) Urethra
b) Syphilis
c) Gonorrhea
d) HIV

11. Which of the following was not the outcome of Mendel's experiments? **[1]**

a) Factors reside in chromosomes
b) Segregation of factors
c) Dominant trait
d) Independent assortment

12. Name a plant that does not have a transport system. **[1]**

a) Banana tree
b) Mango tree
c) Chlamydomonas
d) Banyan tree

13. What does the tangent at any point on magnetic field lines indicate? **[1]**

a) direction of magnetic field
b) direction of the force
c) direction of current
d) direction of induced current

14. The resistance of the conductor is R. If the length is doubled by stretching the wire, then its new resistance will be**:** **[1]**

a) R
b) 4R
c) 8R
d) 2R

15. The ozone layer is mainly damaged by: **[1]**

a) Carbon dioxide
b) Chlorofluorocarbons
c) Methane
d) Sulphur dioxide

16. Organisms of a higher trophic level which feed on several types of organisms belonging to a lower trophic level constitute the **[1]**

a) Ecosystem
b) Food web
c) Ecological pyramid
d) Food chain

17. **Assertion (A):** Exposure of silver chloride to sunlight for a long duration turns grey due to the formation of silver by decomposition of silver chloride. **[1]**
Reason (R): In this process, sublimation of silver chloride takes place.

a) Both A and R are true and R is the correct explanation of A.
b) Both A and R are true but R is not the correct explanation of A.
c) A is true but R is false.
d) A is false but R is true.

18. **Assertion (A):** Regeneration is getting a full organism back from its body parts. **[1]**
Reason (R): In grafting, the stock is placed over the scion.

a) Both A and R are true and R is the correct explanation of A.
b) Both A and R are true but R is not the correct explanation of A.
c) A is true but R is false.
d) A is false but R is true.

19. **Assertion (A):** In Fleming's Left-Hand Rule, the direction of magnetic field, force and current are mutually **[1]**

perpendicular.

Reason (R): Fleming's Left-hand Rule is applied to measure the induced current.

a) Both A and R are true and R is the correct explanation of A.

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

c) A is true but R is false.

d) A is false but R is true.

20. **Assertion (A):** An ecosystem consists of living biological community and its non-living environment. **[1]**

Reason (R): Ecosystem functions as self sufficient or independent unit in nature.

a) Both A and R are true and R is the correct explanation of A.

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

c) A is true but R is false.

d) A is false but R is true.

Section B

21. Write the chemical formula of two consecutive homologous of organic compounds having functional group - OH. What happens to the (i) boiling point and (ii) solubility of organic compounds of a homologous series as the molecular mass increases. **[2]**

22. a. State one drawback of each of the following: **[2]**

I. Oral contraceptive pills

II. Copper-T

b. Under which category of contraceptive methods, is the use of condom kept? In what way, its use is better as compared to other methods of contraception?

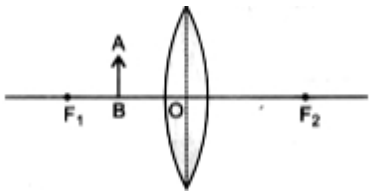
23. What is lymph? Mention its function. **[2]**

OR

Expand ATP and ADP.

24. a. The figure shows the position of an object AB in relation to a converging lens whose foci are F_1 and F_2. **[2]**

Draw two rays to locate the position of image.



b. State three characteristics of image formed.

25. Give scientific terms for the following- **[2]**

(a) The process of eating and being eaten.

(b) The relationship between abiotic and biotic component.

(c) Increasing concentration of a non biodegradable substance, such as a toxic chemical, in the tissues of organisms at successively higher levels in a food chain.

OR

a. List two human-made ecosystems.

b. **We do not clean a pond in the same manner as we do in an aquarium.** Give reason to justify this statement.

26. What would be your suggestion to your grandfather who is undergoing the eye defects both hypermetropia and myopia? **[2]**

Section C

27. A, B and C are 3 elements which undergo chemical reactions according to following equations: **[3]**

a) $A_2O_3 + 2B \rightarrow B_2O_3 + 2A$

b) $3CSO_4 + 2B \rightarrow B_2(SO_4)_3 + 3C$

c) $3CO + 2A \rightarrow A_2SO_3 + 3C$

Answer of the following:

i) Which element is most reactive?

ii) Which element is least reactive?

28. Give the steps involved in the extraction of metals of low and medium reactivity from their respective sulphide ores. **[3]**

OR

i. What is meant by the reactivity series of metals? Arrange the following metals in an increasing order of their reactivities towards water : Zinc, iron, magnesium, Sodium

ii. Hydrogen is not a metal but still it has been assigned a place in the reactivity series of metals. Why?

iii. Name one metal more reactive and another less reactive than hydrogen.

iv. Name one metal which displaces copper from copper sulphate solution and one which does not.

v. Name one metal which displaces silver from silver nitrate solution and one which does not.

29. a. Mention any two components of blood. **[3]**

b. Trace the movement of oxygenated blood in the body.

c. Write the function of valves present in between atria and ventricles.

d. Write one structural difference between the composition of artery and veins.

30. i. In humans, if gene B gives brown eyes and gene b gives blue eyes, what will be the colour of eyes of the persons having the following combination of genes? (a) Bb (b) bb (c) BB **[3]**

ii. What do you class this trait of eye colour in human? Explain.

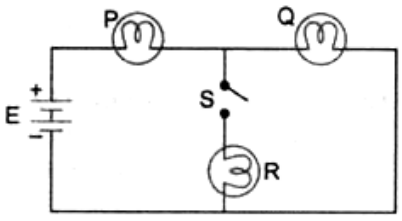
31. "A concave mirror of focal length f can form a magnified, erect as well as an inverted image of an object placed in front of it." Justify this statement stating the position of object with respect to the mirror in each case for obtaining these images. **[3]**

32. Show how would you join three resistors, each of resistance 9 Ω so that the equivalent resistance of the combination is **[3]**

i. 13.5 Ω

ii. 6 Ω?

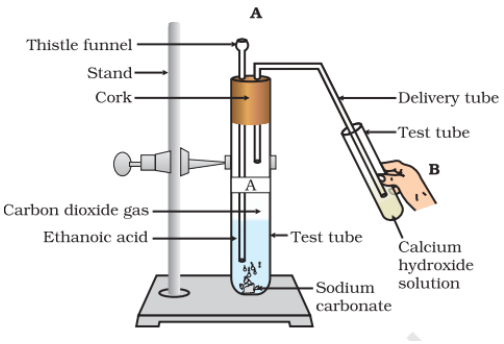
33. A battery E is connected to three identical lamps P, Q and R as shown in figure: **[3]**



Initially the switch S is kept open and the lamp P and Q are observed to glow with same brightness. Then switch S is closed. How will the brightness of the glow of bulbs P and Q will change? Justify your answer.

Section D

34. Look at the given figure and answer the following questions: **[5]**



i. What change would you observe in the calcium hydroxide solution taken in tube B?

ii. Write the reaction involved in test tubes A and B respectively.

iii. If ethanol is given instead of ethanoic acid, would you expect the same change?

iv. How can a solution of lime water be prepared in the laboratory?

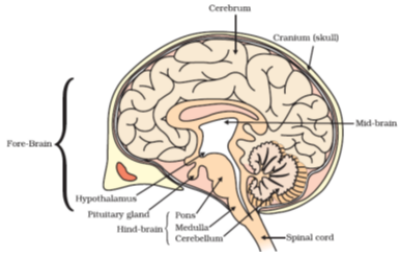
OR

Define covalent bond. Explain with the help of examples.

35. Write the functions of placenta. **[5]**

OR

Given below is a labelled diagram of the human brain.



Using the given diagram, answer the following questions:

i. Which part of the brain controls reflex movements of the head, neck, and trunk?

ii. Name the part of the human brain which contains a vital centre for controlling blood pressure.

iii. Which part of the hindbrain regulates respiration?

iv. How is the brain protected from injuries and shock?

v. Which part of the human brain is the main thinking region?

36. An object of height 4.0 cm is placed at a distance of 30 cm from optical centre **O** of a concave lens of focal length 20 cm. Draw a ray diagram to find the position and size of the image formed. Mark optical centre **O** and principal focus **F** on the diagram. Also, find the approximate ratio of size of the image to the size of the object. **[5]**

OR

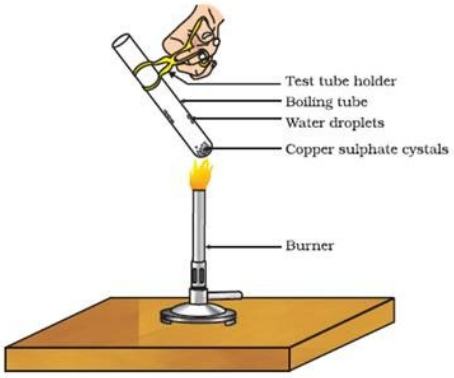
Write laws of refraction. Explain the same with the help of ray diagram, when a ray of light passes through a rectangular glass slab.

Section E

37. **Read the text carefully and answer the questions:** **[4]**

Copper sulphate crystal contains water of crystallisation when the crystal is heated the water is removed and salt turns white. The crystal can be moistened again with water. The water of crystallisation is the fixed number of water molecules present in 1 formula unit of copper sulphate. On heating gypsum at 373K, it loses water

molecules and became calcium sulphate hemihydrate.



(i) If the crystal is moistened with water, then which colour of the crystal reappears?

(ii) What is the commercial name of calcium sulphate hemihydrate?

OR

How many water molecules are present in one formula unit of copper sulphate?

38. **Read the text carefully and answer the questions:** **[4]**

Animals have a nervous system for controlling and coordinating the activities of the body. But plants have neither a nervous system nor muscles. So, how do they respond to stimuli? When we touch the leaves of a chui-mui (the 'sensitive' or 'touch-me-not' plant of the Mimosa family), they begin to fold up and droop. When a seed germinates, the root goes down, the stem comes up into the air. What happens? Firstly, the leaves of the sensitive plant move very quickly in response to touch.

There is no growth involved in this movement. On the other hand, the directional movement of a seedling is caused by growth. If it is prevented from growing, it will not show any movement.

(i) Write the types of movement.

(ii) Give an example of a plant hormone that promotes growth.

(iii) What is the function of the nervous system?

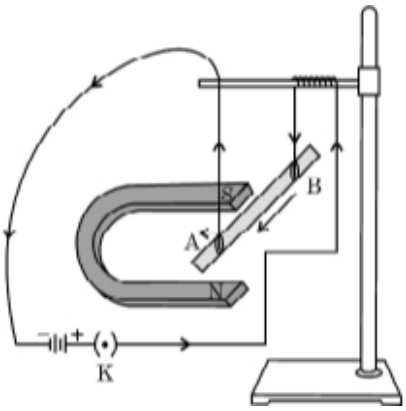
OR

How is the movement of leaves of the sensitive plant different from the movement of a shoot towards light ?

39. **Read the text carefully and answer the questions:** **[4]**

A student was asked to perform an experiment to study the force on a current carrying conductor in a magnetic field. He took a small aluminum rod AB, a strong horse shoe magnet, some connecting wires, a battery and a switch and connected them as shown. He observed that on passing current, the rod gets displaced. On reversing the direction of current, the direction of displacement also gets reversed. On the basis of your understanding of

this phenomenon, answer the following questions:



(i) Why does the rod get displaced on passing current through it?

(ii) State the rule that determines the direction of the force on the conductor AB.

(iii) a. If the U shaped magnet is held vertically and the aluminum rod is suspended horizontally with its end B towards due north, then on passing current through the rod from B to A as shown, in which direction will the rod be displaced?

b. Name any two devices that use current carrying conductors and magnetic field.

OR

Draw the pattern of magnetic field lines produced around a current carrying straight conductor held vertically on a horizontal cardboard. Indicate the direction of the field lines as well as the direction of current flowing through the conductor.

Solution

Section A

1. **(c)** Nitrogen
   Explanation: Rancidity can be prevented by packaging fat and oil-containing foods in nitrogen gas as it is unreactive. Hence, the chips packets are flushed with nitrogen gas to prevent aerial oxidation of fats and oil containing chips.

2. **(d)** decomposition and redox
   Explanation: On further heating, anhydrous ferrous sulphate decomposes to form ferric oxide (Fe_2O_3), sulphur dioxide (SO_2) and sulphur trioxide(SO_3). So, the gas emitted smells like burning sulphur. this may be categorized as a decomposition and redox reaction.

3. **(a)** Aqua regia
   Explanation: Gold is a noble metal and does not react with even concentrated acids. Aqua regia is made by mixing nitric acid and hydrochloric acid in a 1 :3 ratio. It can dissolve even gold and platinum.

4. **(a)** Q
   Explanation: $\underset{\text{Acetic acid}}{CH_3COOH} + \underset{\text{Sodium bicarbonate}}{NaHCO_3} \rightarrow \underset{\text{Sodium acetate}}{CH_3COONa} + \underset{\text{Water}}{H_2O} + \underset{\text{Carbon dioxide}}{CO_2\uparrow}$

5. **(b)** Student C
   Explanation: Fe + ZnSO4 → No reaction
   It is because iron is less reactive than Zinc.
   Zn + $FeSO_4$ → $ZnSO_4$ + Fe
   The solution becomes colourless and black iron gets deposited.

6. **(c)** N
   Explanation: N

7. **(c)** Compound A is C_2H_5OH and B is CH_3COOH
   Explanation: Compound A is ethanol and compound B is ethanoic acid. Ethanol gets oxidized to ethanoic acid when heated in the presence of a strong oxidizing agent. Ethanol is used as an antiseptic to sterilize wounds and syringes by doctors.
   $C_2H_5OH + 2[O] \rightarrow CH_3COOH + H_2O$

8. **(d)** Tadpole
   Explanation: A tadpole lives underwater so it only has one way of gas exchange (through the gills). First, the tadpoles open their mouth to let water enter. Then, the water moves into the gills which contain small membranes called lamella.

9. **(b)** two individuals of a species
   Explanation: species is the lowest level of classification and shows the high level of similarities among the organisms. so two individuals of a species have the maximum common characteristics.

10. **(a)** Urethra
    Explanation: Chlamydia is a common sexually transmitted disease. It is caused by bacteria called Chlamydia trachomatis. It can infect both men and women. In Men, this condition often causes swelling and inflammation of the urethra, accompanied by a penile discharge.

11. **(a)** Factors reside in chromosomes
    Explanation: Gregor Mendel, through his work on pea plants, discovered the fundamental laws of inheritance. He deduced

that genes come in pairs and are inherited as distinct units, one from each parent. Mendel tracked the segregation of parental genes and their appearance in the offspring as dominant or recessive traits.

12.

(c) Chlamydomonas

Explanation: As Chlamydomonas is a genus of green algae that are unicellular (single-cell), about 10 micrometres in diameter that swims with two flagella (flagellates). They are found in stagnant water and in damp soil, in freshwater, seawater. As these are unicellular plants also known to be unicellular algae, there is no point of having any kind of transport system in their body.

13. **(a)** direction of magnetic field

Explanation: Tangent indicates the direction of the magnetic field. It just an alternative used when compass is not available.

14.

(b) 4R

Explanation: The resistance of a uniform metallic conductor is directly proportional to its length (l) and inversely proportional to the area of its cross-section (A). $R = \rho\frac{l}{A}$ where ρ is a constant of proportionality and is called the electrical resistivity of the material of the conductor.

$R_1 = p\frac{l_1}{A_1}$ and $R_2 = \frac{l_2}{A_2}$ and $l_2 = 2l_1$

The volume of the wire remains unchanged.

$\therefore \pi {r_1}^2 l_1 = \pi {r_2}^2 l_2$

$\Rightarrow (\pi {r_1}^2)(l_1) = (\pi {r_2}^2)(l_2)$

$\Rightarrow (A_1)(l_1) = (A_2)(2 \times l_1)$

$\Rightarrow A_2 = \frac{A_1}{2}$

Thus, when the wire is stretched to double its length, the area of cross-section becomes half.

$\therefore R_2 = \rho\frac{l_2}{A_2}$

$\Rightarrow R_2 = \rho\frac{2\times 2\times l_1}{A_1}$

$\Rightarrow R_2 = 4 \times R_1$

Thus, the new resistance becomes four times of the original resistance.

15.

(b) Chlorofluorocarbons

Explanation: The use of chemicals like CFCs has endangered the ozone layer. The decrease in the amount of ozone in the earth's atmosphere has been linked to synthetic chemicals like chlorofluorocarbons (CFCs). CFCs are used as refrigerants and in fire extinguishers.

16.

(b) Food web

Explanation: Food web

17.

(c) A is true but R is false.

Explanation: A is true but R is false.

18.

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

Explanation: Regeneration is the process which involves repair of damaged cells/tissue or replacement or redevelopment of broken body part or reconstruction of whole body from a small body fragment. The simple animals like Hydra and Planaria show regeneration. It means if Hydra or Planaria somehow get cut into a number of pieces, then each body piece can grow into a complete organism.

19.

(c) A is true but R is false.

Explanation: It is used to find the direction of force in a current-carrying conductor in the presence of magnetic field.

20.

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

Explanation: Both A and R are true but R is not the correct explanation of A.

Section B

21. The general formula of the homologous series of the compound- OH group is $C_nH_{2n+1}OH$.

The two consecutive homologous are: Methanol (CH_3OH) and ethanol (C_2H_5OH).

i. As the molecular mass increases in homologous series, the boiling point also increases.

ii. The solubility of an organic compound decreases with increase in molecular mass.

22. a. These are the some drawbacks of using given things:-

i. Oral contraceptive pills :- They can alter the menstrual cycle in some cases and it causes breakthrough bleeding and abdominal pain etc.

ii. Copper -T:- It releases copper ions into the uterus and the presence of copper ions decreases sperm motility and the fertilizing capacity of the sperm .

b. Barrier. Barrier contraceptives are devices that are used to prevent pregnancy by blocking sperm from entering the uterus. Some of them include female condoms, male condoms, contraceptive sponges with spermicide, diaphragms and cervical caps. Among them the most common birth control methods are condoms.

23. Lymph- The fluid present in the spaces between the cells in the tissues is called tissue fluid or lymph. It is a colourless fluid which consist of plasma and leucocutes.

Functions of lymph:-

(i) It returns tissue fluid from the interstitial spaces into the blood.

(ii) Lymph capillaries of intestinal villi called lacteals helps in absorption of fats.

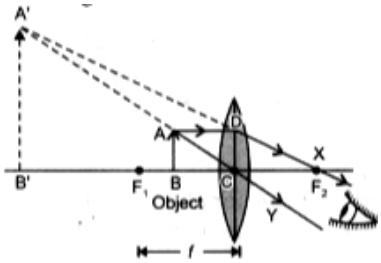
(iii) It collects carbondioxide, waste products and metabolites form tissues via tissue fluid.

OR

ATP: Adenosine triphosphate

ADP: Adenosine diphosphate.

24. a.



b. The three characteristics of the image formed are:

i. Virtual and erect

ii. magnified

iii. behind the object.

25. (a) Food chain

(b) Ecosystem

(c) Bio-magnification

OR

a. i. Artificial ecosystems are man made systems where biotic and abiotic components are brought together so that they can interact with each other and live naturally.

ii. It is not self dependent and can lost without human help.

b. Ponds and lakes are an example of natural ecosystem whereas the aquarium is an example of artificial ecosystem. Ponds do not need to be cleaned because it has microorganisms, like bacteria and fungi that break-down the dead remains and waste products of organisms and clean the pond naturally. The aquarium does not contain soil or decomposing bacteria or fungi which helps in degrading complex organic substance into simple inorganic substance, so it needs to be cleaned from time to time.

26. Myopia is the nearsightedness and hypermetropia is the far-sightedness. The person who is suffering from both eye defects is advised to wear spectacles with a bi-focal lens which consists of both concave and convex lens. The upper portion would be a concave lens which rectifies the distant vision and lower portion is a convex lens which rectifies the near vision.

Section C

27. (i) Most reactive element is B as it has replaced both A and C from their compounds.

(ii) Element C is least reactive as it has been replaced both by A and B.

28. i. **Extraction of Mercury:** Mercury is a metal of low reactivity. Cinnabar, i.e. mercury (II) sulphide is the ore of mercury. It is heated in the air so that it is oxidized to produce mercury (II) oxide. After that, mercury oxide is reduced to obtain mercury.

The following reactions are involved in this process.

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

ii. **Extraction of metals of medium reactivity series:** The metals in the middle of the reactivity series are also extracted by roasting; followed by reduction but the methods are somewhat different.

iii. **Extraction of Zinc:** Zinc ire in the middle of the reactivity series. It is found in the form of zinc-blende which is zinc oxide. It is first heated in the presence of air to obtain zinc oxide. This process can be shown by the following equation.

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

After that, zinc oxide is reduced to obtain pure zinc metal. The reduction is done in the presence of carbon. This can be shown by the following equation.

$ZnO + C \rightarrow Zn + CO.$

OR

i. The arrangement of metals in the order of decreasing reactivities is called reactivity series. Increasing order of reactivity of metal toward water: Iron < zinc < magnesium < sodium

ii. Hydrogen can lose electrons and forms positive ions like metals. Therefore, it has been placed in the reactivity series of metals.

iii. Lead is more reactive than hydrogen and copper is less reactive than hydrogen.

iv. Zinc displaces copper from copper sulphate solution and mercury does not displace copper from copper sulphate solution.

v. Copper displaces silver from silver nitrate solution and gold does not displace silver from silver nitrate solution.

29. a. The two components of blood are: Red blood cells(RBC) also called erythrocytes, are cells that circulate in the blood and carry oxygen throughout the body. These cells are produced in the bone marrow and are released into the bloodstream as they mature. RBCs typically make up about 40% of the blood volume. White blood cells(WBC) are part of the body's immune system. They help the body fight infection and other diseases.

b. Movement of oxygenated blood :- Lungs $\rightarrow$ Left side of the heart $\rightarrow$ aorta $\rightarrow$ body organs

c. They prevent back flow of blood.

d. Artery has thick elastic wall and vein is thin walled.

30. i. Bb will have brown eyes.
bb will have blue eyes.
BB will have brown eyes.

ii. Eye colour in humans is an inherited trait. These are traits that are present in the DNA of an organism and are passed on to their progeny.

31. When an object is placed between Focus and Pole of concave mirror, the image formed is virtual, magnified, erect and behind the mirror.when an object is placed between Curvature and Focus of concave mirror, the image formed is real, magnified, inverted at the same side of mirror.

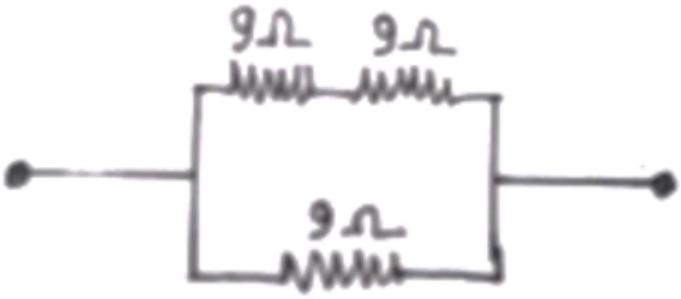
32. i. 

If we connected two 9 ohm resistors in parallel and other 9 ohm resistor in series as shown in figure:

$\frac{1}{R_p} = \frac{1}{9} + \frac{1}{9} = \frac{2}{9}$

$R_p = \frac{9}{2}\Omega$

$R = 9\Omega + \frac{9}{2}\Omega = 13.5\Omega$

ii. 

If we connected two 9 ohm resistors in series and other 9 ohm resistor in parallel as shown in figure:

$R_s = 9\Omega + 9\Omega = 18\Omega$

$\frac{1}{R} = \frac{1}{18} + \frac{1}{9} = \frac{3}{18}$

$\therefore R = 6\Omega$

33. The brightness of the glow of bulb P will increase and brightness of the glow of bulb Q will decrease. This is because on closing S, bulbs Q and R will be in parallel and the combination will be in series with bulb P. Hence the total resistance of the circuit will decrease and the current flowing in the circuit will increase. Therefore, the glow of bulb P will increase.
Also, since bulbs Q and R will be in parallel in this case, the current gets divided and lesser current flows through Q and hence the glow of bulb Q will decrease.

Section D

34. i. Calcium hydroxide solution in the test tube B becomes milky.

ii. The reaction in test tube A:

$CH_3COOH + NaHCO_3 \longrightarrow CH_3COONa + CO_2 + H_2O$

The reaction in test tube B:

$Ca(OH)_2 + CO_2 \longrightarrow CaCO_3 + H_2O$

iii. Ethanol does not react with sodium hydrogen carbonate. Hence, the same change cannot be observed.

iv. For this, take distilled water in a beaker and mix calcium carbonate powder in it. After stirring thoroughly, wait till the mixture settles. Decant the clear liquid from the beaker. This liquid is lime water.

OR

Covalent bond: The bond formed by equal contribution and mutual sharing of electrons between two atoms so that both the atoms acquire the stable nearest noble gas configuration i.e. get their octet complete is called covalent bond.

The mutually shared electrons become the common property of both the bonded atoms.

The number of electrons contributed by an atom of the element for mutual sharing during the formation of a covalent bond is called its covalency.

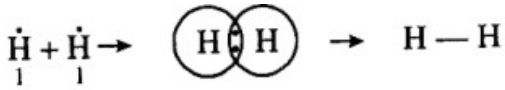
Each pair of shared electrons is represented by putting a single line (—) between two atoms.

In the example given below :

Element	At no.	Electronic configuration
H	1	1
C	6	2,4
O	8	2, 6
N	7	2, 5

Examples,

i. Formation of a hydrogen molecule(H_2): At no. of hydrogen = 1. It has one electron is the first orbit. When two hydrogen atoms approach each other they share their single electron present in their first orbits. Each hydrogen atom can now be thought of as having noble gas configuration of helium. It may represented as:



Formation of H_2 molecule

ii. Formation of chlorine molecule. Two chlorine atoms combine with each other to form a molecule of chlorine. In this case, both the atoms have seven electrons in their outermost shell and they contribute one electron each to form a covalent bond. Thus, both the chlorine atoms acquire noble gas configuration of argon. This may be depicted as:

Formation of Cl_2 molecule

iii. Formation of HCl molecule. A covalent bond is formed not only between similar atoms but it may be formed between dissimilar atoms also. For example, hydrogen and chlorine form a covalent bond between their atoms. Hydrogen atom has only one electron and chlorine atom has seven electrons in its valence shell. Therefore, by mutual sharing of electron pair between a hydrogen and a chlorine atom both the atoms acquire nearest noble gas configuration. Hydrogen atom acquires electronic configuration of helium whereas chlorine atom gets electronic configuration of argon.

35. The placenta serves primarily as an organ that permits the interchange of materials carried in the blood of mother and foetus. The main functions are:

1) Nutrition: Supply of nutrient materials to foetus.

2) Respiration: Supply of O_2 to foetus and receive CO_2 back from it.

3) Excretion: Fluid nitrogenous waste products escape through the placenta.

4) Barrier: The placenta is barrier like semipermeable membrane.

5) Storage: The placenta stores fat, glycogen and iron for the embryo before the formation of liver.

6) Hormonal function: The placenta secures extra ovarian hormones estrogen and progesterone in female during pregnancy that serves to maintain foetus.

OR

i. The midbrain controls the reflex movements of the head, neck, and trunk in response to visual and auditory stimuli.

ii. The medulla contains a vital centre for controlling blood pressure, respiration, swallowing, salivation, vomiting, sneezing, and coughing.

iii. Pons regulates respiration.

iv. The brain is protected by a bony box called cranium, within that three layers of fluid-filled membranes called meninges are present for absorbing shock.

v. The forebrain is the largest part of the brain and is the main thinking region.

36. Given: focal length f = +20 cm, object distance u = -30 cm, height of object h_o= 4 cm.

We know that, $\frac{1}{f} = \frac{1}{v} - \frac{1}{u}$

$\frac{1}{20} = \frac{1}{v} - \frac{1}{-30}$

$\frac{1}{v} = \frac{1}{60}$

$\Rightarrow$ v = 60 cm

So, $\frac{h_i}{h_0} = \frac{v}{u}$

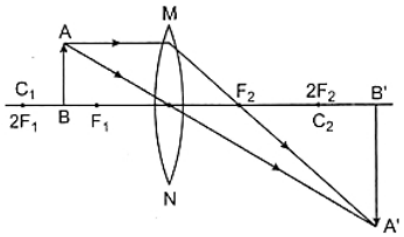
$\frac{h_i}{h_0} = \frac{60}{-30}$

$\Rightarrow$ $-t_i$ = -8 cm

Thus, the height or size of the image is 8 cm. The minus sign shows that this height is in the downward direction, that is, the image is formed below the axis.

Ratio of size of image to object = -2

So image is enlarged beyond $2F_2$



Object between F_1 and $2F_1$.

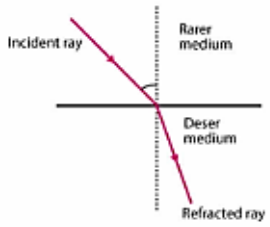
Image is formed beyond $2F_2$, real, inverted.

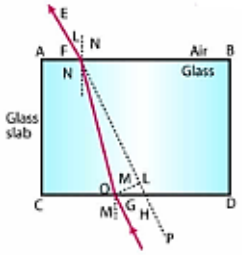
OR

Laws of refraction are as follows:

i. Incident ray, refracted ray and normal at the point of incidence lie in the same plane.

ii. Ratio of sine of incidence and sine of refraction is constant for the given color and pair of media.

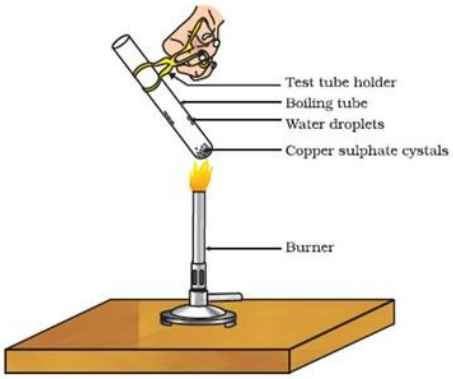




Section E

37. **Read the text carefully and answer the questions:**

Copper sulphate crystal contains water of crystallisation when the crystal is heated the water is removed and salt turns white. The crystal can be moistened again with water. The water of crystallisation is the fixed number of water molecules present in 1 formula unit of copper sulphate. On heating gypsum at 373K, it loses water molecules and became calcium sulphate hemihydrate.



(i) If the crystal is moistened with water, then the blue colour of the crystal reappears.

(ii) The commercial name of calcium sulphate hemihydrate is Plaster of Paris.

OR

Five water molecules are present in one formula unit of copper sulphate.

38. **Read the text carefully and answer the questions:**

Animals have a nervous system for controlling and coordinating the activities of the body. But plants have neither a nervous system nor muscles. So, how do they respond to stimuli? When we touch the leaves of a chui-mui (the 'sensitive' or 'touch-me-not' plant of the Mimosa family), they begin to fold up and droop. When a seed germinates, the root goes down, the stem comes up into the air. What happens? Firstly, the leaves of the sensitive plant move very quickly in response to touch.

There is no growth involved in this movement. On the other hand, the directional movement of a seedling is caused by growth. If it is prevented from growing, it will not show any movement.

(i) There are two types of movement:

a. dependent on growth

b. independent on growth.

(ii) Auxin is a plant hormone that promotes growth.

(iii)The function of the nervous system is to control and coordinate the activities of the body.

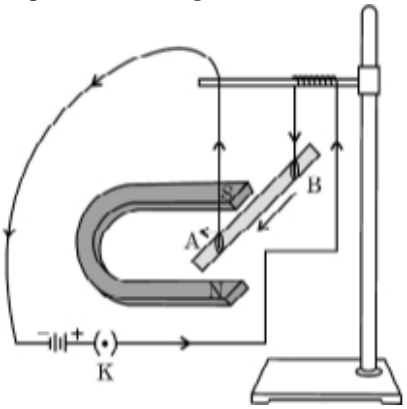
OR

The movements of the leaves of the sensitive plant are touch sensitive and independent of growth while the movement of the shoot towards light is growth related and known as phototropism.

39. **Read the text carefully and answer the questions:**

A student was asked to perform an experiment to study the force on a current carrying conductor in a magnetic field. He took a small aluminum rod AB, a strong horse shoe magnet, some connecting wires, a battery and a switch and connected them as shown. He observed that on passing current, the rod gets displaced. On reversing the direction of current, the direction of

displacement also gets reversed. On the basis of your understanding of this phenomenon, answer the following questions:



(i) When current is passed through the rod is produces magnetic field due to which feels a force and due to it rod displaces from its position.

(ii) Fleming's left hand rule gives the direction of force experienced by current carrying conductor placed in an external magnetic field.

According to Fleming's left hand rule if we arrange our thumb, forefinger and middle finger of the left hand perpendicular to each other, then the thumb points towards the direction of the magnetic force, the forefinger points towards the direction of the magnetic field and the middle finger points towards the direction of the current.

(iii) a. According to Fleming's left-hand rule, the rod will get displaced upwards.

b. Devices that use current-carrying conductors and magnetic fields are electric motors, electric generators, loudspeakers, and microphones.

OR