Class X Session 2023-24
Subject - Science
Sample Question Paper - 1

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 food items like cheese that is shown in the given below image become unfit for eating. This happens due to: **[1]**

a) Corrosion
b) Rusting
c) None of these
d) Rancidity

2. We will observe white ppt in which of the following reaction? **[1]**

a) Barium chloride is mixed with hydrochloric acid
b) Barium chloride is mixed with sodium chloride solution
c) Barium chloride is mixed with sodium sulphate solution
d) Barium carbonate is mixed with sodium sulphate solution

3. To protect tooth decay we are advised to brush our teeth regularly. The nature of the tooth paste commonly used is **[1]**

a) Neutral
b) Acidic

c) Corrosive

d) Basic

4. Ethanol reacts with sodium and forms two products. These are **[1]**

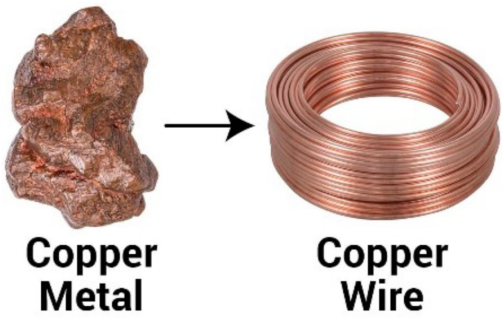
a) sodium ethanoate and hydrogen

b) sodium ethanoate and oxygen

c) sodium ethoxide and oxygen

d) sodium ethoxide and hydrogen

5. The property of metal by which it can be drawn into wires is called: **[1]**



a) Ductility

b) Malleability

c) Conductivity

d) Sonorous

6. Non-metals do not replace hydrogen from acids because**:** **[1]**

a) They are more reactive than hydrogen.

b) None of these

c) They are less reactive than hydrogen.

d) Non-metal being acceptors of electrons.

7. A hydrocarbon which can add two molecules of Br_2 is **[1]**

a) $H_2C = CH - CH = CH_2$

b) $H_3C - CH = CH - CH_3$

c) $HC \equiv CH$

d) Both $H_2C = CH - CH = CH_2$ and $HC \equiv CH$

8. To make all connections airtight, in the experiment, we use **[1]**

a) Either vaseline or wax

b) Wax

c) Vaseline

d) Lubricant oil

9. The branch of biology-related with heredity and variation is called **[1]**

a) Livinglogy

b) Genetics

c) Evolution

d) Taxonomy

10. Binary fission in some organisms occurs in definite orientation in relation to the cell structures. One such organisms is: **[1]**

a) Leishmania

b) Plasmodium

c) Amoeba

d) Bacteria

11. The genetic constitution of an organism is called **[1]**

a) Genome

b) Trait

c) Genotype

d) Phenotype

12. Where are proteins first digested in the alimentary canal? **[1]**

a) Oesophagus

b) Small intestine

c) Stomach
d) Mouth

13. Which rule determines the direction of flow of current in the conductor? **[1]**

a) Fleming's left hand rule
b) Fleming's right hand rule
c) Maxwell's right hand grip rule
d) Left hand thumb rule

14. If the area of cross-section of a resistance wire is halved, then its resistance becomes: **[1]**

a) 4 times
b) One-half
c) 2 times
d) One-fourth

15. Montreal protocol became effective in: **[1]**

a) 1985
b) 1987
c) 1992
d) 1989

16. Ozone depletion has resulted in: **[1]**

a) More UV radiations on earth
b) Warming of earth
c) Decrease in temperature
d) Less UV radiations on earth

17. **Assertion (A):** The blue colour of copper starts fading when a zinc rod is dipped into it. **[1]**
Reason (R): When an iron nail dipped in the copper sulphate solution then iron displaces copper from the copper sulphate because iron is more reactive then copper.

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):** Condom protects a person from the sexually transmitted diseases. **[1]**
Reason (R): Condom prevents the sperms from meeting the ovum by acting as a barrier.

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):** A compass is kept near a wire carrying current gets deflected. **[1]**
Reason (R): Electric current is capable of producing a magnetic effect.

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):** Biotic components of ecosystem continuously require energy to carry on life processes. **[1]**
Reason (R): Abiotic components are the non-living factors of the ecosystem.

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. Out of sodium chloride (NaCl) or methyl chloride (CH_3 Cl), which has higher melting and boiling points? Why? **[2]**

22. Newly formed DNA copies may not be identical at times. Give one reason. **[2]**

23. What are the disadvantages of transpiration? **[2]**

OR

What are the differences between aerobic and anaerobic respiration? Name some organisms that use the anaerobic mode of respiration.

24. What is the power of a combination of lenses? **[2]**

25. In the following food chain, 5 J of energy is available to man. How much energy was available at producer level? **[2]**

Plants → Sheep → Man

OR

Your uncle has come from the village to renew the contract to supply frogs to the laboratories of the colleges of the town. While talking to you, he mentioned that cases of malaria have increased in his village. In addition population of grasshoppers has also increased who are damaging crops.

i. What could be the reasons for such problems faced by villagers?

ii. What suggestions will you give to your uncle?

26. What is dispersion? What happens when light is passed through a glass prism? **[2]**

Section C

27. There are 3 unknown metals - A, B and C. C displaces B from its oxide while with oxide of A, there is no reaction. Give the reactivity order of A, B and C. **[3]**

28. i. How do you classify elements into metals and non-metals on the basis of their electronic configuration? **[3]**

Choose metal and non-metal out of the following:

$^{23}_{11}A, ^{19}_{9}B, ^{24}_{12}C, ^{31}_{15}D, ^{35}_{17}E$

ii. What type of bond will be formed if

a. 'A' combines with 'B'?

b. 'A' combines with 'E'?

c. 'C' combines with 'E'?

d. 'D' combines with 'E'?

OR

i. Write the steps involved in the extraction of pure metals in the middle of the activity series from their carbonate ores.

ii. How is copper extracted from its sulphide ore? Explain the various steps supported by chemical equations. Draw labelled diagram for the electrolytic refining of copper.

29. a. Name the process and explain the type of nutrition found in green plants. List the raw materials required for the process. Give chemical equation for the mentioned process. **[3]**

b. Write the three observation that occur during this process.

30. In pea plant, round seed is dominant over the wrinkled. If a cross is carried out between these two plants, give answer to the following questions. **[3]**

i. Mention the genes for the traits of parents.

ii. State the trait of F_1 hybrids.

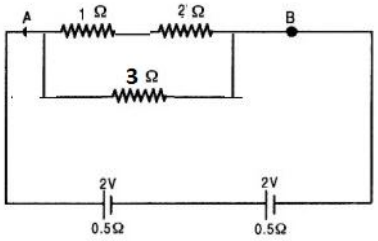
iii. Write the ratio of F_2 progeny obtained from this cross. What is the name of the cross?

31. How can you distinguish between plane mirror, convex mirror and concave mirror by merely looking at the image formed in each case? **[3]**

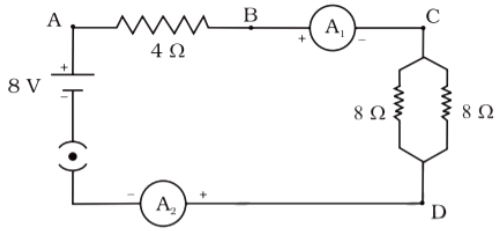
32. Given in fig. is the circuit diagram in which three resistors of 1Ω, 2Ω and 3Ω are connected to cell of e.m.f. 2V and internal resistance 0.5 Ω. **[3]**

i. Calculate the total resistance of the circuit.

ii. What is the reading of ammeter and What will be ammeter reading if an exactly similar cell is connected in series with the given cell ?



33. Find out the following in the electric circuit given in Figure **[3]**



i. The effective resistance of two 8 Ω resistors in the combination

ii. Current flowing through 4 Ω resistor

Section D

34. i. What are hydrocarbons? Give examples. **[5]**

ii. Give the structural differences between saturated and unsaturated hydrocarbons with two examples each.

iii. What is functional group? Give examples of four different functional groups.

OR

a. You have three unlabelled test tubes containing ethanol, ethanoic acid and soap solution. Explain the method you would use to identify the compounds in different test tubes by chemical tests using litmus paper and sodium metal.

b. Give the reason for the formation of scum when soaps are used with hard water.

35. What is vegetative propagation? Describe various methods of vegetative propagation? **[5]**

OR

List some functions of the human brain.

36. An object 4.0 cm in size, is placed 25.0 cm in front of a concave mirror of focal length 15.0 cm. **[5]**

i. At what distance from the mirror should a screen be placed in order to obtain a sharp image?

ii. Find the size of the image.

iii. Draw a ray diagram to show the formation of an image in this case.

OR

i. One half of a convex lens of focal length 10 cm is covered with a black paper. Can such a lens produce an image of a complete object placed at a distance of 30 cm from the lens? Draw a ray diagram to justify your answer.

ii. A 4 cm tall object is placed perpendicular to principal axis of a convex lens of focal length 20 cm. The distance of the object from the lens is 15 cm. Find the nature, position and the size of the image.

Section E

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

Salt of a strong acid and strong base is neutral with a pH value of 7. NaCl common salt is formed by a combination of hydrochloride and sodium hydroxide solution. This is the salt that is used in food. Some salt is called rock salt, bed of rock salt was formed when seas of bygone ages dried up. The common salt thus obtained is an important raw material for various materials of daily use, such as sodium hydroxide, baking soda, washing soda, and bleaching powder.

(i) If given acids are phosphoric acid, carbonic acid, hydrochloric acid and sulphuric acid, then which acid does not form an acidic salt?

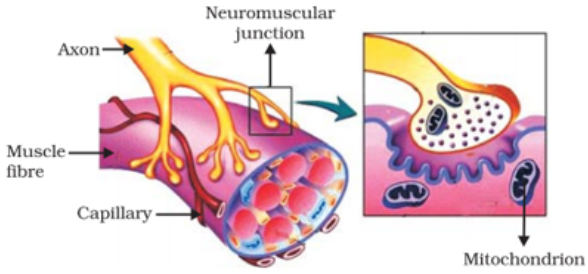
(ii) What is the formula of baking soda?

OR

Name the substance which on treatment with chlorine to obtain bleaching powder.

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

In animals, control and coordination are provided by nervous and muscular tissues. Touching a hot object is an urgent and dangerous situation for us. We need to detect it and respond to it. How do we detect that we are touching a hot object? All information from our environment is detected by the specialised tips of some nerve cells. These receptors are usually located in our sense organs, such as the inner ear, the nose, the tongue, and so on. So gustatory receptors will detect taste while olfactory receptors will detect the smell. This information, acquired at the end of the dendritic tip of a nerve cell sets off a chemical reaction that creates an electrical impulse. This impulse travels from the dendrite to the cell body, and then along the axon to its end. At the end of the axon, the electrical impulse sets off the release of some chemicals. These chemicals cross the gap, or synapse, and start a similar electrical impulse in the dendrite of the next neuron. This is a general scheme of how nervous impulses travel in the body. A similar synapse finally allows the delivery of such impulses from neurons to other cells, such as muscles cells or glands.



(i) Why does the flow of signals in a synapse from axonal end of one neuron to dendritic end of another neuron take place but not in the reverse direction?

(ii) From where the electrical impulse travels?

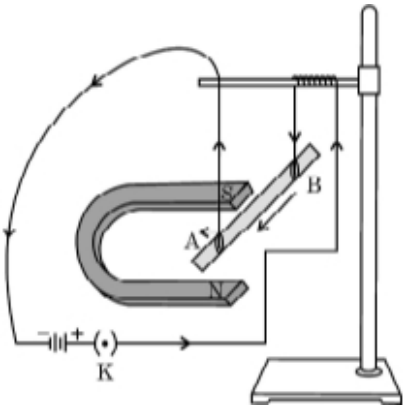
(iii) Name the chemical which released at the end of axon to transmit the signal to the other neuron.

OR

What happens at the synapse between 2 neurons?

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) i. In the above experimented set up, when current is passed through the rod, it gets displaced towards the left. What will happen to the displacement if the polarity of the magnet and the direction of current both are reversed?

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

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

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

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. **(d)** Rancidity
   Explanation: Rancidity spoils the food materials prepared in fats and oils which have been kept for a considerable time and makes them unfit for eating. Hence, the cheese shown in the image becomes unfit for eating due to rancidity.

2. **(c)** Barium chloride is mixed with sodium sulphate solution
   Explanation: On mixing a solution of barium chloride with sodium sulphate, a white precipitate of barium sulphate is immediately formed. These reactions are ionic in nature.
   $BaCl_2 + Na_2SO_4 \rightarrow BaSO_4 + 2NaCl$

3. **(d)** Basic
   Explanation: Tooth decay occurs when the pH falls to 5.5 since toothpaste is alkaline or basic in nature so it helps to neutralize the excess acid in mouth.

4. **(d)** sodium ethoxide and hydrogen
   Explanation: This reaction can be shown by the following equations:
   $2Na + 2CH_3CH_2OH \longrightarrow 2CH_3CH_2ONa + H_2$
   Therefore, the products formed are sodium ethoxide and hydrogen.

5. **(a)** Ductility
   Explanation: Ductility

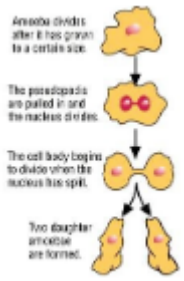
6. **(d)** Non-metal being acceptors of electrons.
   Explanation: Non-metals are electronegative. They do not provide free electrons. Hence they do not replace hydrogen from acids.

7. **(d)** Both $H_2C = CH - CH = CH_2$ and $HC \equiv CH$
   Explanation: To add two molecules of Br_2, a hydrocarbon should have two double bonds or one triple bond.

8. **(c)** Vaseline
   Explanation: Vaseline is involved in all the joints in the experimental set-up, thereby making the set-up air-tight.

9. **(b)** Genetics
   Explanation: Genetics is the study of genes, genetic variation, and heredity in living organisms. It is generally considered a field of biology, but intersects frequently with many other life sciences and is strongly linked with the study of information systems.

10. **(c)** Amoeba
    Explanation: Binary fission is a type of asexual reproduction and the most common form of reproduction in prokaryotes and eukaryote. Amoeba reproduces by the common asexual reproduction method called binary fission. After replicating its genetic material through mitotic division, the cell divides into two equal sized daughter cells.



11.

(c) Genotype

Explanation: The genotype is the part (DNA sequence) of the genetic makeup of a cell, and therefore of an organism or individual, which determines a specific characteristic of that cell/organism/individual.

12.

(c) Stomach

Explanation: Stomach

13.

(b) Fleming's right hand rule

Explanation: The direction of induced current in a straight conductor is given by Fleming's right-hand rule.

It states that if we stretch the thumb, forefinger and the middle finger of the right hand at right angles to one another in such a way that the forefinger points in the direction of the magnetic field.

Then, thumb gives the direction of motion of conductor (force), forefinger indicates the direction of magnetic field, and the middle finger points the direction of induced current.

14.

(c) 2 times

Explanation: 2 times

15.

(d) 1989

Explanation: The Montreal Protocol became effective in 1989. The Montreal Protocol is a protocol to the Vienna Convention for the Protection of the Ozone Layer. It is an international treaty designed to protect the ozone layer by phasing out the production of numerous substances that are responsible for ozone depletion.

16. **(a)** More UV radiations on earth

Explanation: The ozone layer shields the surface of the earth from ultraviolet (UV) radiation from the Sun. Ozone depletion has resulted in more UV radiations on earth.

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

Explanation: When an iron nail dipped in the copper sulphate solution then iron displaces copper from the copper sulphate because iron is more reactive than copper. Therefore the colour of the copper sulphate solution changes. The reaction involved is:

$Fe_{(s)} + CuSO_{4(aq)} \longrightarrow FeSO_{4(aq)} + Cu(s)$

Thus both assertion and reason are true and reason is the correct explanation of the assertion.

18.

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

Explanation: Condoms are used by males. These are rubber or plastic sheaths which are put on penis before copulation. The condom prevents the sperms from meeting the ovum (or egg) by acting as a barrier between them. The benefit of condom is that it protects a person from syphilis and AIDS.

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

Explanation: Here while carrying out an experiment if a compass needle is placed near a wire carrying current then due to the effect of magnetism which is produced due to electric current produced in the wire the needle gets deflected. Which shows that the magnetism and electricity are interlinked. So, both assertion and reason are true and reason is the correct explanation of assertion.

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 intermolecular forces are small in the covalent compounds.So, These bonds break easily. Hence, covalent compounds have low melting and boiling point.The intermolecular forces are small in the covalent compounds. These bonds break easily. Hence, covalent compounds have low melting and boiling point.

    Sodium chloride (Na^+Cl^-) is an ionic compound, therefore it's melting and boiling points are higher than methyl chloride (CH_3Cl) which is a covalent compound.

22. During the time of DNA replication most of the base sequence in daughter cells are identical to the parent DNA but sometimes due to mutations or some errors during replication some changes in the newly formed DNA copies may occur. So it is said that newly formed DNA copies may not be identical at times.

23. 1) More plants die from excessive water loss by transpiration.

    2) Due to high rate of transpiration plants suffer from loss of turgidity.

    OR

    (a) Differences between aerobic and anaerobic respiration

Aerobic respiration	Anaerobic respiration
1) It takes place in the presence of oxygen.	1) It takes place in the absence of oxygen.
2) It is completed in cytoplasm and mitochondria of cells.	2) It is completed in the cytoplasm only.
3) It involves the complete oxidation of glucose into CO_2 and H_2O .	3) It involves the incomplete oxidation of glucose into CO_2 and alcohol or lactic acid.
4) One molecule of glucose on complete oxidation releases 674 K cals of energy.	4) One molecule of glucose on oxidation releases 28 K cal of energy.
5) The process is harmless.	5) It is toxic to plants.
6) Large amount of energy is released, i.e. 36 ATP molecules per glucose molecule.	6) Small amount of energy is released, i.e. 2 ATP molecules per glucose molecule.

    b) Organisms which use anaerobic respiration are yeasts, bacteria and parasites like tapeworm, Ascaris, etc.

24. If n number of lenses are placed in close contact, then the power of the combination of lenses is equal to algebraic sum of the powers of the individual lenses.

    $P = P_1 + P_2 + ... + P_n$

25. According to law if 5 J of energy is available to man then 10% energy is available to primary consumer so primary consumer is filled with 50J. Producers consume only 1% of energy which is available from sun therefore 5000J of energy is available to the producers.

    OR

    i. As uncle is supplying frogs from his village to laboratories so the number of frog population is decreasing. Frogs eat grasshoppers and mosquitoes. But as the number of frogs population is reduced so the population of grasshoppers and mosquitoes are increasing. So malaria is spread in the village by mosquitoes and grasshoppers are causing damage to the crops.

    ii. He must stop the supply of frogs to the laboratories as the reduced frog population is causing an imbalance in the food chain and proper ratio of frogs, grasshoppers and mosquitoes can not be maintained in the ecosystem.

26. The phenomenon of splitting up of white light into its constituent colurs as it passes through prism is known as dispersion. Light rays bend towards the normal when it enters the prism. Since white light consists of 7 colours it splits into 7 bands of colour.

Section C

27. C displaces B from its oxide, therefore, C is more reactive than B.

    There is no reaction when C is treated with oxide of A or C does not displace A from its oxide. So, A is more reactive than C.

    Thus, the reactivity order is B< C< A.

28. i. Elements which contain 1 to 3 electrons in their outermost shell are metals. Elements containing 4 to 7 electrons in their valence shell are non-metals.

    Electronic configurations:

    ${}^{23}_{11}Na(Z = 11) = 2, 8, 1$

    ${}^{19}_{9}B(Z = 9) = 2, 7$

$^{24}_{12}C(Z = 12) = 2, 8, 2$
$^{31}_{15}D(Z = 15) = 2, 8, 5$
$^{35}_{17}E(Z = 17) = 2, 8, 7$
Hence A and C are metals whereas, B, D and E are non-metals.

ii. Type of bonds

a. 'A' is metal and 'B' is non-metal, so the bond formed will be ionic.

A =2, 8,1 B = 2, 7

Ionic bond

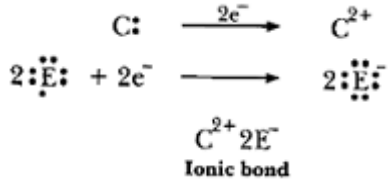
b. 'A' is metal and 'E is non-metal, so the bond formed is ionic.

A = 2, 8, 1 B = 2, 7

Ionic bond

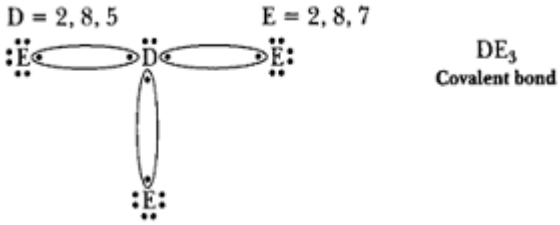
c. 'C' is metal and 'E' is non-metal, so the bond formed is ionic.

C = 2, 8, 2 E = 2, 8, 7



$C^{2+}2E^-$
Ionic bond

d. 'D' is a non-metal and 'E' is also a non-metal, so the bond formed will be covalent.



DE_3
Covalent bond

OR

i. Pure metals are extracted from their carbonate ores through the following steps:

a. **Concentration of Ore:**

Gangue first needs to be removed from the ore keeping in mind the differences in physical and chemical properties of gangue and ore.

b. **Calcination:**

The carbonate ores must be heated strongly in the absence of air to convert them into metal ores.

For example: $ZnCO_3(s) \xrightarrow{\Delta} ZnO + CO_2(\uparrow)$

c. **Reduction:**

Next, reduction is carried out using a more reactiave metal or carbon.

For example: ZnO + C $\rightarrow$ Zn + CO

This happens because carbon has a greater binding affinity for oxygen than Zinc does.

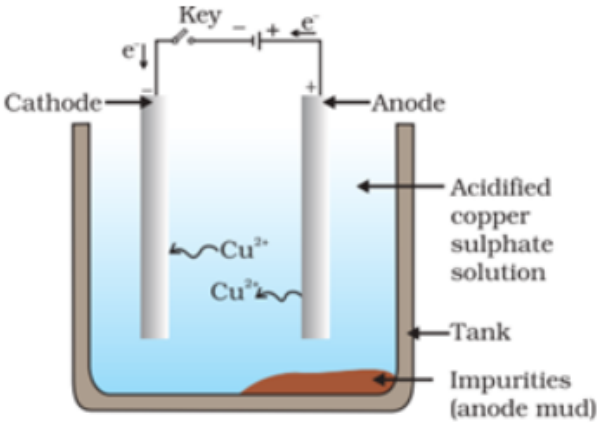
Finally, the obtained metal is refined by electrolysis of their salt solutions.

ii. Copper glance is the ore of copper sulphide. It is first roasted and then the remaining Cu_2O is reduced using Cu_2S in the tank.

$2Cu_2S + 3O_2 \xrightarrow{\Delta} 2Cu_2O + 2SO_2$

$2Cu_2O + Cu_2S \xrightarrow{\Delta} 6Cu + SO_2$

This way, copper metal is extracted.



Electrolytic refining of copper: The electrolyte is a solution of acidified copper sulphate. The anode is impure copper, whereas, the cathode is a strip of pure copper. On passing electric current, pure copper is deposited on the cathode.

29. a. Photosynthesis is the process and the type of nutrition found in green plants is autotrophic Nutrition.
In autotrophic nutrition, plants prepare their own food using inorganic material such as CO_2 and H_2O in the presence of Sunlight and Chlorophyll.

$$6CO_2 + 12H_2O \xrightarrow{\text{Chlorophyll Sunlight}} \underset{\text{Glucose}}{C_6H_{12}O_6} + 6O_2 + 6H_2O$$

The raw materials used in photosynthesis are CO_2, H_2O.

b. The three observations are given below:
(i) Absorption of light energy by chlorophyll
(ii) Conversion of light energy to chemical energy and splitting of water molecules into hydrogen and oxygen
(iii) Reduction of Carbon dioxide to Carbohydrates

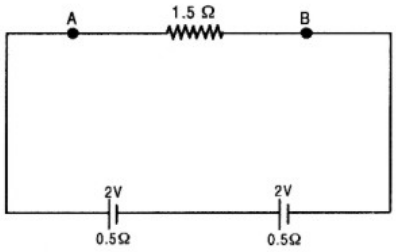
30. i. RR for homozygous pure round. And rr for homozygous pure wrinkle pea plant.
ii. Rr (hybrid) - heterozygous. All are round since round is dominant over wrinkled.
iii. 3:1 (phenotypic ratio), 1:2:1 (genotypic ratio) The name of this cross is monohybrid cross.

31. 1. If image is of same size, laterally inverted and erect, it is plane mirror.
2. If image is bigger or smaller in size and inverted or erect, it is concave mirror.
3. If image is smaller in size and erect as in rear view mirror , it is convex mirror.

32. ResisOKtance, 1Ω and 2Ω are in series and combined resistance i.e. 1 + 2 = 3Ω in parallel with 3Ω.
Hence total resistance of the combination is $\frac{1}{R} = \frac{1}{3} + \frac{1}{3} = \frac{2}{3}$ *or* $R = \frac{3}{2} = 1.5\Omega$

i. Total resistance of the circuit = R + r = 1.5 + 0.5 = 2Ω
ii. Total current through ammeter = $\frac{E}{R+r} = \frac{2}{2} = 1A$
iii. In second case total e.m.f.= 2 + 2 = 4V

Total resistance = 1.5 + 0.5 + 0.5 = 2.5Ω
Current through circuit in second case = $\frac{4}{2.5} = \frac{40}{25} = \frac{8}{5} = 1.6\ A$



33. Given :-
Resistor, R_1 = 4 Ω
Resistor, R_2 = 8 Ω
Resistor, R_3 = 8 Ω
Potential Difference, V = 8 volts.

i. Since two 8Ω resistances are in parallel, their effective resistance (Rp) is given by $\frac{1}{R'} = \frac{1}{8} + \frac{1}{8} + \frac{1}{4}$ or R' = 4Ω
ii. The total resistance in the circuit, $R = 4\Omega + R_p = 4\Omega + 4\Omega = 8\Omega$
Current through the electric circuit, $I = \frac{V}{R} = \frac{8}{4} = 2A$

Since 4Ω resistor and Rp are in series, the current through 4Ω resistors = 1A.

Section D

34. i. The compounds that are made up of carbon and hydrogen atoms are called hydrocarbons, e.g. methane (CH_4), ethane ($CH_2 = CH_2$). Ethyne (C_2H_2), cyclohexane (C_6H_{12}), benzene (C_6H_6)etc.

    ii. In saturated hydrocarbons, all the four valencies of carbon are satisfied by a single covalent bond while in unsaturated hydrocarbons, double or triple bonds are required to satisfy the valencies of carbon, e.g.

    a. Saturated hydrocarbons
    Methane (CH_4), Ethane ($CH_3 — CH_3$)

    b. Unsaturated hydrocarbons
    Ethene ($H_2C = CH_2$), Ethyne ($HC \equiv CH$)

    iii. A functional group is an atom or group of atoms that define the structure (or the properties) of organic compounds. The four examples are:

    a. -OH Alcohol
    b. -COOH Carboxylic acid
    c. -CHO Aldehyde
    d. -X Halogen

OR

a. With litmus paper;
Ethanol: No change in colour
Ethanoic acid: Blue litmus turns red
Soap solution: Red litmus turns blue
The ethanol solution will release hydrogen when sodium is added to it. The hydrogen gas can be tested by bringing a lighted matchstick near it. It will burn with a 'pop' sound.

b. Hard water contains salts of calcium and magnesium. When soap is added to hard water, calcium and magnesium ions present in water displace sodium or potassium ions from the soap molecules forming an insoluble substance called scum.

35. The growth of new plants from vegetative parts of the plant like roots, stem, and leaves other than the seeds is called vegetative propagation. Various artificial methods of vegetative propagation are:

i. **Cutting:** Small piece of plant parts like roots, stem or leaves is cut and used for propagation. **Examples:** Rose, sugarcane etc.
ii. **Layering:** It is the process where roots are induced when a stem comes in contact with the ground. **Examples:** Grapevine, mango etc.
iii. **Grafting:** It is a process of joining a part of a living plant like a stem or bud to another plant and they grow as one plant. **Examples:** Lime, lemon etc.
iv. **Propagation by plant tissue culture:** In this method, plant cells are cultured in an artificial culture media, where a cell divides into an undifferentiated mass of cells called callus which is transferred to different nutrient mediums to grow into plantlets.

In natural methods of vegetative propagation underground roots [Root tubers of Dahlia] or underground stems [bulbs of onions, rhizomes of ginger] or adventitious buds on leaves [Bryophyllum] grow into new plants.

OR

Major functions of the human brain are:

i. The cerebral cortex is greatly enlarged in human brains and is considered the seat of complex thought.It coordinates activities of the body so that mechanism and hormonal reactions of the body work together.
ii. Visual processing takes place in the occipital lobe, near the back of the skull
iii. The temporal lobe is located behind our ears and extends to both sides of the brain involved in vision, memory, sensory input, language, emotion.
iv. The parietal lobe integrates input from different senses and is important for spatial orientation and navigation. It receives information carrying nerve impulses from all the sensory organs of the body.
v. The primary functions of the brain stem include relaying information between the brain and the body; supplying some of the cranial nerves to the face and head; and performing critical functions in controlling the heart, breathing and consciousness.
vi. The thalamus relays sensory and motor signals to the cortex and is involved in regulating consciousness, sleep and alertness. The hypothalamus connects the nervous system to the endocrine system where hormones are produced via the pituitary gland.

vii. The cerebellum lies beneath the cerebrum and has important functions in motor control. It plays a role in coordination and balance and may also have some cognitive functions.

36. Given: Height of object (h_o) = 4 cm

Object distance (u) = -25 cm(-ve as it is in front of mirror)

Focal length (f) = -15 cm

i. Applying mirror formula and substituting the values,

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

$\frac{1}{v} = \frac{1}{-15} - \frac{1}{-25}$

$\frac{1}{v} = \frac{-5+3}{75}$

v = $\frac{-75}{2}$ = -37.5 cm

The negative sign indicates that the image is in front of the mirror.

Therefore, the screen must be placed in front of the mirror at a distance of 37.5 cm.

ii. Applying the magnification formula and substituting the values,

m = $\frac{-v}{u} = \frac{h_i}{h_o}$

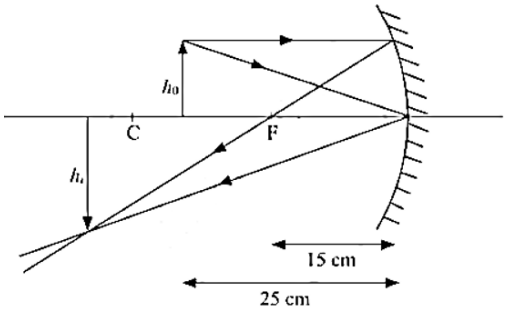
$\frac{-\left(\frac{-75}{2}\right)}{-25} = \frac{h_i}{4}$

$h_i = \frac{-75}{2\times25} \times 4$

h_i = -6 cm

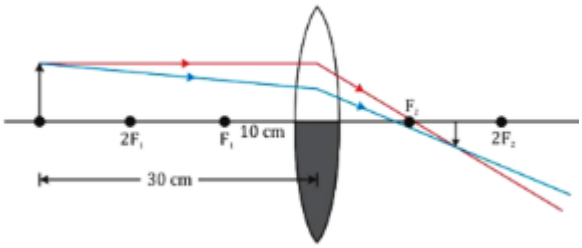
The image will be 6cm high and it will be inverted.

iii. The ray diagram showing the formation of image in this case is,



OR

When a convex lens is covered half with black paper as shown in diagram, then image of full object will formed , but it will be of less intensity and brightness.



As h_0 = 4 cm, f = 20 cm and u = - 15 cm

By lens formula,

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

$\Rightarrow \frac{1}{v} = \frac{1}{f} + \frac{1}{u} = \frac{1}{20} + \frac{1}{(-15)} = \frac{15-20}{300} = \frac{-5}{300}$

$\therefore \ v = -60cm$

As, magnification,

m = $\frac{h_i}{h_0} = \frac{v}{u}$

$\Rightarrow h_i = h_0 \times \frac{v}{u} = 4 \times \frac{-60}{-15} = 16\ cm$

Image formed is virtual, erect and magnified.

Section E

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

Salt of a strong acid and strong base is neutral with a pH value of 7. NaCl common salt is formed by a combination of hydrochloride and sodium hydroxide solution. This is the salt that is used in food. Some salt is called rock salt, bed of rock salt

was formed when seas of bygone ages dried up. The common salt thus obtained is an important raw material for various materials of daily use, such as sodium hydroxide, baking soda, washing soda, and bleaching powder.

(i) Carbonic acid does not form an acidic salt.

(ii) Sodium bicarbonate, commonly known as baking soda or bicarbonate of soda, is a chemical compound with the formula $NaHCO_3$.

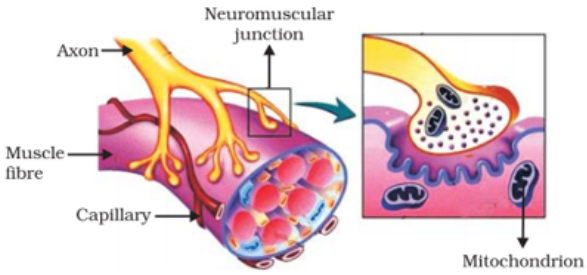
OR

$Ca(OH)_2$ treatment with chlorine to obtain bleaching powder.

$Ca(OH)_2 + Cl_2 \longrightarrow CaOCl_2 + H_2O$

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

In animals, control and coordination are provided by nervous and muscular tissues. Touching a hot object is an urgent and dangerous situation for us. We need to detect it and respond to it. How do we detect that we are touching a hot object? All information from our environment is detected by the specialised tips of some nerve cells. These receptors are usually located in our sense organs, such as the inner ear, the nose, the tongue, and so on. So gustatory receptors will detect taste while olfactory receptors will detect the smell. This information, acquired at the end of the dendritic tip of a nerve cell sets off a chemical reaction that creates an electrical impulse. This impulse travels from the dendrite to the cell body, and then along the axon to its end. At the end of the axon, the electrical impulse sets off the release of some chemicals. These chemicals cross the gap, or synapse, and start a similar electrical impulse in the dendrite of the next neuron. This is a general scheme of how nervous impulses travel in the body. A similar synapse finally allows the delivery of such impulses from neurons to other cells, such as muscles cells or glands.



(i) At the synapse, (functional junction between neurons) axon terminal comes in close proximity to the dendron terminal of next neuron. Axon terminal is expanded to form pre-synaptic knob and the other dendrite terminal forms post- synaptic depression.

(ii) The electrical impulse travels form the dendrite to the cell body, then along the axon to its end.

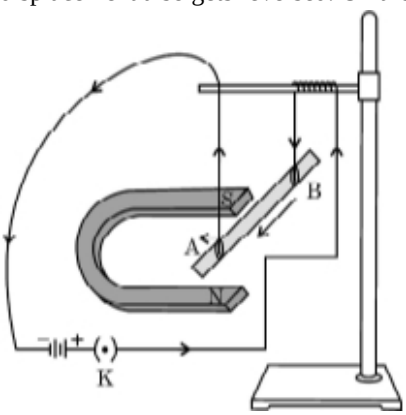
(iii) Acetylcholine is released at the end of the axon to transmit the signal to the other neuron.

OR

A synapse is a gap between two neurons. At the synapse, the electrical signals are converted into chemicals that can easily cross over the gap and pass on to the next neurons where it again converted into electrical signals.

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) i. If the polarity of the magnet and the direction of current both are reversed,using Fleming's left hand rule it gets displaced towards the left.

ii. Devices that use current-carrying conductors and magnetic fields are electric motor, electric generator etc.

(ii) When a current-carrying conductor is placed in a magnetic field, it experiences a force, due to which the rod gets displaced.

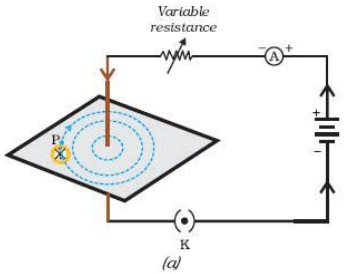
(iii) The rule that determines the direction of the force on the conductor AB is Fleming's left-hand rule.

According to 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 force.

OR

The magnetic field lines around a current carrying conductor can be represented by concentric circles which can be determined by right hand thumb rule.



(a)

(b)