# Class X Session 2026-27
# Subject - Science
# Sample Question Paper - **9**

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

**General Instructions:**

1. This question paper consists of 39 questions in 3 sections. Section A is Biology, Section B is Chemistry and Section C is Physics.
2. All questions are compulsory. However, an internal choice is provided in some questions. A student is expected to attempt only one of these questions.

## Section A

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

   a) Dead cells
   b) $CO_2$
   c) Resins and gums
   d) Starch

2. In an experiment with pea plants, a pure tall plant (TT) is crossed with a pure short plant (tt). The ratio of pure tall plant to pure short plants in $F_2$ generation will be **[1]**

   a) 1 : 3
   b) 3 : 1
   c) 2 : 1
   d) 1 : 1

3. Select the option that contains only biodegradable wastes. **[1]**

   a) Jute bag, Mouldy bread, Newspaper
   b) Cotton cloth, Mango fruit, Nylon wire
   c) Orange peel, Metal key, Roti
   d) Aluminium can, Keyboard, Plastic bag

4. Match the following with correct response. **[1]**

| Column A | Column B |
|---|---|
| (i) Cretinism | (a) Over secretion of growth hormone |
| (ii) Gigantism | (b) Under secretion of ADH |
| (iii) Exophthalmia | (c) Over secretion of thyroxin |
| (iv) Diabetes insipidus | (d) Deficiency of thyroxin |

   a) (i) - (a), (ii) - (c), (iii) - (b), (iv) - (d)
   b) (i) - (b), (ii) - (d), (iii) - (a), (iv) - (c)
   c) (i) - (d), (ii) - (a), (iii) - (c), (iv) - (b)
   d) (i) - (c), (ii) - (b), (iii) - (d), (iv) - (a)

5. A food chain will be more advantageous in terms of energy if it has **[1]**

a) 3 trophic levels
b) 2 trophic levels
c) 5 trophic levels
d) 4 trophic levels

6. Which of the following statements about the autotrophs is incorrect? **[1]**

a) They store carbohydrates in the form of starch
b) They convert $CO_2$ and water into carbohydrates in the absence of sunlight
c) They synthesize carbohydrates from $CO_2$ and water in the presence of sunlight & chlorophyll
d) They constitute the first trophic level in food chains

7. Application of Abscisic acid on plants promotes: **[1]**

a) Formation of flowers
b) Development of fruits
c) Elongation of stem
d) Wilting of leaves

8. **Assertion (A):** Seeds are matured ovules. **[1]**
**Reason (R):** The part of seed which contains stored food for baby plant is called cotyledon.

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.

9. **Assertion (A):** Using jute bags while shopping is more environment friendly as compared to polythene bags. **[1]**
**Reason (R):** Jute is biodegradable whereas polythene bag is non-biodegradable.

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.

10. List some reasons for adopting contraceptive methods. If a woman is using copper-T will it help in protecting her from sexually transmitted diseases? **[2]**

11. Using the following information form a pathway showing the formation of ozone at higher levels. And also include information that is not mentioned below to complete it. **[2]**
Ozone, UV, Molecular oxygen.

OR

What are decomposers? List two consequences of their absence in the ecosystem.

12. List the functions of testosterone and estrogen. **[2]**

13. Study the following cross that shows the self-pollination in $F_1$, fill in the blank the genotype and phenotype in the F1 generation. What type of cross it is? **[3]**

| Parents | RRYY | x | rryy |
|---|---|---|---|
| | Round, yellow | | wrinkled, green |
| $F_1$ — | Rr Yy | x | ? |
| | | | |

| | | | |
|---|---|---|---|
| | Round, yellow | | |

14. During respiration in an organism A, one molecule of glucose produces 2 ATP molecules whereas in respiration of another organism B, one molecule of glucose produces 38 ATP molecules. **[3]**

i. Which organism is undergoing aerobic respiration?
ii. Which organism is undergoing anaerobic respiration?
iii. Which type of organism A or B can convert glucose into alcohol?
iv. Name one organism which behaves like A.
v. Name one organism which behaves like B.

15. **Read the following text carefully and answer the questions that follow:** **[4]**

Sex determination is the method by which distinction between males & females is established in a species. The sex of an individual is determined by specific chromosomes. These chromosomes are called sex chromosomes or allosomes. X and Y chromosomes are called sex chromosomes. The normal chromosomes other than the sex chromosomes of an individual are known as autosomes.

i. In XX-XO type of sex determination who produces two different types of gametes? (1)
ii. A couple has six daughters. What is the possibility of their having a girl next time? (1)
iii. What is the number of autosomes present in the liver cells of a human female? (2)

**OR**

XX-XO type of sex determination and XX-XY type of sex determination are examples of which heterogamety? (2)

16. **[5]**

a. Suggest any two categories of contraceptive methods to control the size of human population which is essential for the prosperity of a country. Also explain about each method briefly.
b. Name two bacterial and two viral infections each that can get sexually transmitted.
c. List two advantages of using condom during sexual act.

OR

a. Why is the use of iodised salt advisable? Name the disease caused due to deficiency of iodine in our diet and state its one symptom.
b. How do nerve impulses travel in the body? Explain.

## Section B

17. Find the incorrect statement: **[1]**

A. The pH of the stomach is approximately 4.5
B. Plants grow well in natural soil
C. The pH of acid rain is nearly 5.6
D. The pH of rainwater is nearly 7

a) Statement (B)
b) Statement (D)
c) Statement (C)
d) Statement (A)

18. Soap doesn't work well with woollen garments because: **[1]**

A. It is basic in nature and woollen garments have acidic dyes.

B. It is acidic in nature and woollen garments have basic dyes.

a) (A) b) (B)

c) None of these d) Both (A) and (B)

19. Study the following cases: **[1]**

i. $CuSO_4 + Mg \longrightarrow$

ii. $FeSO_4 + Pb \longrightarrow$

iii. $CaSO_4 + Al \longrightarrow$

iv. $ZnSO_4 + Ca \longrightarrow$

The case/cases in which new product(s) will form is/are:

a) (i) and (iv) b) Only (iii)

c) (i), (ii) and (iv) d) Only (i)

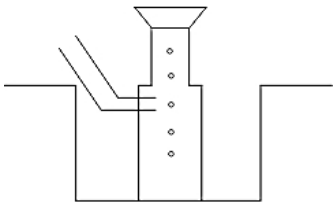
20. Match the following with the correct response: **[1]**

| Column A | Column B |
|---|---|
| (i) Copper is used in electrical appliances | (a) Hydrogen sulphide |
| (ii) Sodium is very reactive | (b) Good conductor |
| (iii) Silver is tarnished | (c) Graphite |
| (iv) A non-metal and a good conductor | (d) Stored in kerosene |

a) (i) - (b), (ii) - (d), (iii) - (a), (iv) - (c) b) (i) - (d), (ii) - (a), (iii) - (c), (iv) - (b)

c) (i) - (c), (ii) - (b), (iii) - (d), (iv) - (a) d) (i) - (a), (ii) - (c), (iii) - (b), (iv) - (d)

21. A metal is heated with dil $H_2SO_4$. The gas evolved is collected by the method shown in the figure. Answer the following questions based on it: **[1]**



Name the method used for the collection of gas.

a) Downward replacement method b) Upward displacement method

c) Upward replacement method d) Downward displacement method

22. Few organic reactions are given below. Which of the reactions is not named correctly? **[1]**

a) $CH_3CH_2OH \xrightarrow{\text{acidified } K_2Cr_2O_7} \underset{\text{(Cumbustion)}}{CH_3COOH}$

b) $CH_3COOC_2H_5 \xrightarrow{NaOH} \underset{\text{(Saponification)}}{CH_3COONa + C_2H_5OH}$

c) $CH_3COONa + NaOH \rightarrow \underset{\text{(Decarboxylation)}}{CH_4 + Na_2CO_3}$

d) $CH_3COOH + C_2H_5OH \xrightarrow{H^+} \underset{\text{(Esterification)}}{CH_3COOC_2H_5} + H_2O$

23. NaCl and $Na_2SO_4$ belong to the family of **[1]**

a) neutral salts
b) sulphate salts
c) sodium salts
d) chloride salts

24. **Assertion (A):** The Plaster of Paris is stored in moisture. **[1]**
**Reason(R):** Plaster of Paris sets into a hard mass on wetting with water to form anhydrous calcium sulphate.

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.

25. Kedar heated a few crystals of copper sulphate in a dry boiling tube. **[2]**
a. What will be the color of the copper sulphate after heating?
b. Will you notice water droplets in the boiling tube?
c. Where have these come from?

26. A brown substance X on heating in air forms a substance Y. When hydrogen gas is passed over heated Y, it again changes back into X. Name the substances X and Y. **[3]**

OR

2g of silver chloride is taken in a china dish and the china dish is placed in sunlight for some time. What will be your observation in this case ? Write the chemical reaction involved in the form of a balanced chemical equation. Identify the type of chemical reaction.

27. Hydrogen is not a metal but it has been assigned a place in the reactivity series of metals. Explain. **[3]**

28. **Read the following text carefully and answer the questions that follow:** **[4]**
When oxygen combines with other elements or compounds, the process is called oxidation the substances that combine with oxygen are said to have been oxidized.
The reduction is exactly the opposite of oxidation. If a substance loses oxygen during a reaction, it is said to be reduced. When hydrogen burns the hydrogen combines with oxygen to form water $2H_2 + O_2 = H_2O$

The hydrogen is oxidized in this reaction, but at the same time, the oxygen is reduced. Whatever oxidation occurs reduction must also occur.

i. Which chemical process is used for obtaining a metal from its oxide? (1)
ii. In the given reaction, which reactant species is oxidized? (1)
iii. In the given reaction, which reactant species is reduced? (2)

**OR**

If four molecules of Hydrogen are combined with oxygen then how many molecules of water are formed? (2)

29. i. Draw electron dot structure of chlorine molecule. (Atomic Number of Chlorine = 17) **[5]**

ii. What happens when chlorine reacts with methane in the presence of sunlight? Write the name of the reaction.

iii. Name the two oxidising agents used for the conversion of alcohols to acids.

iv. List four differences in properties between covalent compounds and ionic compounds.

OR

a. Define the term "homologous series of carbon compounds". Write a homologous series of compounds having functional group -CHO.

b. Design an experiment to distinguish between an alcohol and a carboxylic acid. Also write chemical equation for that case in which reaction occurs.

## Section C

30. Which of the following statement is incorrect? **[1]**

A. A ray of light passing from an optically rarer medium to an optically denser medium bends away from the normal.

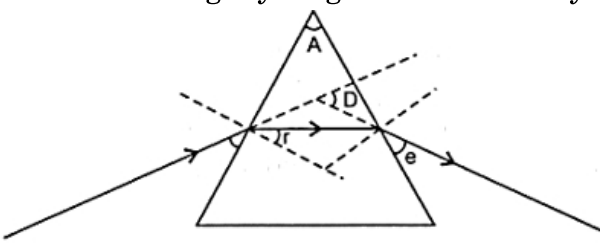
B. A ray of light passing from an optically denser medium to an optically rarer medium bends away from the normal.

C. A ray of light passing from an optically rarer medium to an optically denser medium bends toward the normal.

D. A ray light passing from an optically denser medium to an optically rarer medium bends towards the normal.

a) A, B and D
b) B and C
c) A and C
d) A and D

31. In the following ray diagram the correctly marked angles are: **[1]**




a) ∠A and ∠D
b) ∠r, ∠A and ∠D
c) ∠i and ∠e
d) ∠i, ∠e and ∠D

32. **Assertion (A):** A neutral body may experience a net nonzero magnetic force. **[1]**
**Reason (R):** The net charge on a current-carrying wire is zero, but it can experience a force in a magnetic field.

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.

33. State reasons to explain these observations. **[2]**

a. Our eye is more sensitive to yellow colour but even then danger signals are red in colour.

b. Violet colour is seen at the bottom of the spectrum when light is displaced by a prism.

34. A hot plate of an electric oven connected to a 220 V line has two resistance coils A and B,each of 24Ω resistance, which may be used separately, in series, or in parallel. What are the currents in the three cases? **[2]**

OR

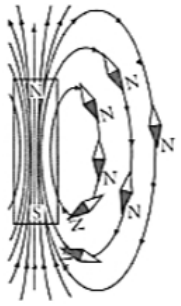
You have two circuits:

(i) a 6V battery is series with 1Ω and 2Ω resistors

(ii) a 4V battery in parallel with 12Ω and 2Ω. resistors

Compare the power used in 2Ω resistor in each case.

35. A magnetic field is described by drawing the magnetic field lines. When a small north magnetic pole is placed in the magnetic field created by a magnet, it will experience a force. And if the north pole is free, it will move under the influence of the magnetic field. The path traced by a north magnetic pole free to move under the influence of a magnetic field is called a magnetic field line. **[3]**



i. Do the magnetic field lines intersect each other? If not why?

ii. A strong bar magnet is placed vertically above a horizontal wooden board. What will be the magnetic lines of force?

36. 1. Write the function of each of the following parts of human eye : cornea, iris, crystalline lens, ciliary muscles. **[3]**

2. Millions of people of the developing countries of world are suffering from corneal blindness. These people can be cured by replacing the defective cornea with the cornea of a donated eye.

A charitable society of your city has organised a campaign in your neighbourhood in order to create awareness about this fact.

If you are asked to participate in this mission how would you contribute in this noble cause?

1. State the objective of organising such campaigns.
2. List two arguments which you would give to motivate the people to donate their eyes after death.
3. List two values which are developed in the persons who actively participate and contribute in such programme.

37. i. Imagine that you are sitting in a chamber with your back to one wall. An electron beam, moving horizontally from back wall towards the front wall, is deflected by a strong magnetic field to your right side. What is the direction of magnetic field? **[3]**

ii. Two circular coils A and B placed closed to each other. If the current in the coil A is changed, will some current be induced in coil B? Give reason.

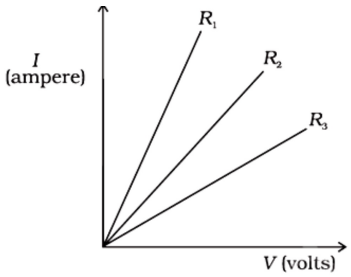
38. **Read the following text carefully and answer the questions that follow:** **[4]**

In 1827, a German physicist Georg Simon Ohm (1787-1854) found out the relationship between the current I, flowing in metallic wire and the potential difference across its terminals. He stated that the electric current flowing through a metallic wire is directly proportional to the potential difference V, across its ends provided its temperature remains the same.

The resistance of a circuit is defined as the ratio between the voltage applied to the current flowing through it. Rearranging the above relation,

$R = \frac{V}{I}$

Electric charge flows easily through some materials than others. The electrical resistance measures how much the flow of this electric charge is restricted within the circuit.




i. What is the unit of electrical resistance? (1)

ii. Define Ohm's law. (1)

iii. From graph which resistance have high resistance? (2)

**OR**

What does the slope of V-I graph at any point represent? (2)

39. An object 2 cm high is placed at a distance of 16 cm from a concave mirror which produce a real image 3 cm high. **[5]**

(i) What is the focal length of the mirror ?

(ii) Find the position of the image.

OR

a. A 5 cm tall object is placed perpendicular to the principal axis of a convex lens of focal length 20 cm. The distance of the object from the lens is 30 cm. Find the position, nature and size of the image formed.

b. Draw a labelled ray diagram showing object distance, image distance and focal length in the above case.

# Solution

## Section A

1.

**(d)** Starch
**Explanation:**
Starch

2.

**(d)** 1 : 1
**Explanation:**
A cross between (TT) and (tt) would produce progenies with following genotypes-
In $F_2$ generation - selfing of $F_1$ progeny-

| Gametes Tt | T | t |
|---|---|---|
| T | TT | Tt |
| t | Tt | tt |

Pure tall (TT), Mixed tall (Tt) and Short (tt). The ratio of pure tall and pure short plant is 1 : 1.

3. **(a)** Jute bag, Mouldy bread, Newspaper
**Explanation:**
Biodegradable wastes are waste materials that can be easily decomposed by microorganisms. Organic wastes like orange peel, roti, cotton cloth, mango fruit, jute bag, mouldy bread, newspaper, etc., are biodegradable.

4.

**(c)** (i) - (d), (ii) - (a), (iii) - (c), (iv) - (b)
**Explanation:**

- It is a condition of severely stunted physical and mental growth owing to untreated congenital deficiency of thyroid hormone.
- Gigantism is a rare condition that causes abnormal growth in children caused by growth hormones.
- Protrusion of the eyeball from the orbit, caused by disease, especially hyperthyroidism, or injury.
- A disorder of salt and water metabolism marked by intense thirst and heavy urination.

5.

**(b)** 2 trophic levels
**Explanation:**
2 trophic levels

6.

**(b)** They convert $CO_2$ and water into carbohydrates in the absence of sunlight
**Explanation:**
They convert $CO_2$ and water into carbohydrates in the **presence** of sunlight and chlorophyll. This process is called Photosynthesis.

7.

**(d)** Wilting of leaves
**Explanation:**

Wilting of leaves

8. **(b)** Both A and R are true but R is not the correct explanation of A.
**Explanation:**
Ovule is gradually converted into a seed. A seed is the reproductive unit of a plant. The seed contains a baby plant (or embryo) and food for the baby plant. The part of baby plant in seed which develops into shoot with leaves is called plumule and the part which develops into root is called radicle. The part of seed which contains stored food for the baby plant is called cotyledon.

9. **(a)** Both A and R are true and R is the correct explanation of A.
**Explanation:**
Jute bags can be reused repeatedly for shopping and get decomposed when discarded. Polybags on the other hand keep on accumulating as solid waste and harm our environment. They can clog drainage, pollute river bodies and are extremely dangerous to grazing animals who chew them mistakenly. So, jute bags are more environment friendly than polybags.

10. Some reasons for adopting contraceptive methods are:
    i. To prevent unwanted pregnancies.
    ii. To control population growth.
    iii. To prevent transmission of sexually transmitted diseases.
    iv. For proper health of mother and child by increasing gap between successive pregnancies.

    No, copper-T will not help in protecting woman from sexually transmitted diseases because it only prevents implantation in uterus.

11. Ozone production $\longrightarrow$ UV radiation acting on oxygen ($O_2$) molecule $\longrightarrow$ the higher UV energy UV radiations split apart some molecular oxygen (O2) $\longrightarrow O^2 \longrightarrow O + O \longrightarrow$ free oxygen (O) atoms then $\longrightarrow$ combine with molecular oxygen ozone $O + O_2 \longrightarrow O_3$ (Ozone).

    OR

    Decomposers : Micro-organisms which break up the dead complex organic matter into simpler form. They play a crucial role in recycling nutrients back into the environment, making them available for other organisms to use. Common decomposers include bacteria, fungi, and certain types of insects.
    Consequences:
    i. No nutrient recycling
    ii. Natural cleaning will not occur (Natural scavenger)

12. **Functions of testosterone:** Develops male reproductive organs and secondary sexual characters.
    **Functions of estrogen:** Develops female genital organs and secondary sexual characters.

13.

| Parents | RRYY | x | rryy |
|---|---|---|---|
| | Round, yellow | | wrinkled, green |
| $F_1$ — | Rr Yy | x | Rr Yy |
| | Round, yellow | | **Round, yellow** |

    The given cross is a dihybrid cross that shows the inheritance of two different traits simultaneously. In the given question, when pure breeding dominant parent plant (RRYY) crossed with pure breeding recessive parent plant (rryy), it gives heterozygous dominant progeny in the $F_1$ generation. All progeny in this cross will have genotype RrYy and exhibit round yellow. Self-cross of F1 progeny will give $F_2$ generation.

14. i. Organism B undergoes aerobic respiration. In aerobic respiration more ATP is produced.

ii. Organism A undergoes anaerobic respiration. In anaerobic respiration less ATP is produced.
iii. Organism A can convert glucose into alcohol
iv. Yeast (anaerobic respiration)
v. Human being (aerobic respiation)

Anaerobic respiration can be of 2 types one is known as fermentation in which end products are ethyl alcohol and carbon dioxide along with ATP and other one is when pyruvate gets converted to lactic acid and carbon dioxide along with ATP.

15. i. Males produce two different types of gametes
In XX-XO type and XX-XY type of sex-determining mechanisms, males produce two different types of gametes, either with or without X-chromosome (XO type), or some gametes with X-chromosome and some with Y-chromosome (XY type). Such type of sex determination mechanism is designated to be the example of male heterogamety. In both, females are homogametic and produce X type of gametes in both cases and have XX genotype.

ii. 50%
The possibility of having a girl or boy child is equal i.e., 50%, as 50% of male gametes are Y type and 50% are X type. Fusion of egg with X-type sperm will produce a girl child.

iii. 22 pairs
In human beings, 23 pairs of chromosomes are found. Out of these 22 pairs are autosomes and one pair is a sex chromosome. In men, the 23rd pair consists of X and Y chromosomes whereas in women X and X chromosomes are present.

**OR**

Male heterogamety
In XX-XO type and XX-XY type of sex-determining mechanisms, males produce two different types of gametes, either with or without X-chromosome (XO type), or some gametes with X-chromosome and some with Y-chromosome (XY type). Such type of sex determination mechanism is designated to be the example of male heterogamety. In both, females are homogametic and produce X type of gametes in both cases and have XX genotype.

16. a. Categories of Contraceptive methods:
i. Mechanical Barrier - The sperm does not reach the egg.
ii. Contraceptive Pills - Change the hormonal balance so that the eggs are not released.
iii. Contraceptive devices - Placed in the uterus to prevent pregnancy.
iv. Surgical methods- Blocking / cutting of vas deferens/ fallopian tube.

b. Two bacterial infections:
(i) Gonorrhoea
(ii) Syphillis
Two viral infections:
(i) AIDS
(ii) Warts

c. **Protection against Sexually Transmitted Infections (STIs):** Condoms act as a barrier, preventing direct contact between bodily fluids, thereby reducing the risk of transmitting or acquiring STIs, including HIV, chlamydia, gonorrhea, and HPV.
**Prevention of Unintended Pregnancy:** Condoms are an effective method of contraception when used correctly and consistently.

OR

a. Iodised salt is advisable because Iodine present in iodised salt is essential for functioning of thyroid and formation of thyroxine hormone. The disease caused due to deficiency of iodine is Goitre. The symptom due to goitre is Swollen neck.

b. Nerve impulses travels from dendrite to cell body, then along the axon to its end. At the end, some chemicals are released which fill the gap of synapse, and starts a similar electrical impulse to another neuron and the impulse further travel in the body.

**Section B**

17.

**(d)** Statement (A)

**Explanation:**

The human stomach produces gastric juices which contain hydrochloric acid in them resulting in a pH of 1.4.

18. **(a)** (A)

**Explanation:**

Soap is basic in nature. Acid dyes are used to dye protein fibres such as silk, wool, angora, mohair, feathers, etc. Hence, soap doesn't work well with woolen garments. The soap gets neutralized by the acidic dyes.

19. **(a)** (i) and (iv)

**Explanation:**

(i) and (iv)

20. **(a)** (i) - (b), (ii) - (d), (iii) - (a), (iv) - (c)

**Explanation:**

- Copper is a good conductor of electricity and is used in electrical appliances.
- Sodium is very reactive and is stored under kerosene.
- Silver is tarnished by hydrogen sulphide. Tarnish is a thin layer of corrosion that forms over it.
- Graphite is an allotrope of carbon and a good conductor of electricity. It is used for making carbon electrodes and graphite electrodes in dry cells and electric arcs.

21.

**(d)** Downward displacement method

**Explanation:**

Using downward displacement method, hydrogen gas is collected over water.

22. **(a)** $CH_3CH_2OH \xrightarrow[\text{(Cumbustion)}]{\text{acidified } K_2Cr_2O_7} CH_3COOH$

**Explanation:**

$\underset{\text{Ethanol}}{CH_3CH_2OH} \xrightarrow[\text{heat}]{\text{acidified } K_2Cr_2O_7} \underset{\text{Acetic acid}}{CH_3COOH}$

It is an oxidation reaction in which ethanol is oxidised to acetic acid in the presence of acidified potassium dichromate.

23.

**(c)** sodium salts

**Explanation:**

All salts having sodium ions as positive radical belong to the same family, i.e. sodium family. For example sodium chloride, sodium sulphate, sodium nitrate, etc.

24.

**(d)** A is false but R is true.

**Explanation:**

Plaster of Paris is stored in a moisture-proof container because the Plaster of Paris sets into a hard mass on wetting with water to form dihydrated calcium sulphate (gypsum).

25. a. The blue colour of the copper sulphate crystals turns to white.
    b. Yes, we will notice water droplets in the boiling tube.
    c. Copper sulphate crystals ($CuSO_4$ .$5H_2O$) have water of crystallization as the part of crystals which gets removed on heating.

26. The substance X is copper. On heating in air, it forms copper oxide, Y.

$$\underset{\text{Copper powder (Brown) (X)}}{2Cu} + \underset{\text{(From air)}}{O_2} \longrightarrow \underset{\text{Copper oxide (Black) (Y)}}{2CuO}$$

When hydrogen gas is passed over black copper oxide, hydrogen acts as a reducing agent and it turns copper oxide back into copper.

$$\underset{\text{Copper (II) oxide (Black) (Y)}}{CuO(s)} + H_2(g) \longrightarrow \underset{\text{Copper (Brown) (X)}}{Cu(s)} + H_2O(l)$$

OR

- In this reaction, we will observed that the white colour of Silver chloride changes to Greyish white due to the formation of Silver metal. The decomposition of silver chloride is caused by light. This reaction is used in black and white photography.
- $2AgCI(s) \xrightarrow{Sunlight} 2Ag\ (s) + Cl_2(g)$
- Decomposition reaction / Photolytic decomposition.

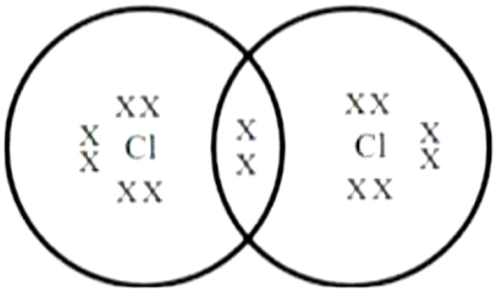
27. Hydrogen has a tendency to lose an electron and forms a positive ion $H^+$ like metals although hydrogen is not a metal yet it has been assigned a place in the reactivity series of metals. The metals which lose electrons less readily than hydrogen are placed below it and the metals which lose electrons more readily than hydrogen are placed above it in the reactivity series of metals.

28. i. The process is known as the reduction of metal oxide.
ii. In the given reaction, $H_2$ is oxidized.
iii. In the given reaction, $O_2$ is reduced.

**OR**

If four molecules of Hydrogen are combined with oxygen then four molecules of water are formed.

29. i.




ii. $CH_4 + Cl_2 \xrightarrow{\text{Sunlight}} CH_3Cl + HCl$
/Chloromethane is formed;
- substitution reaction

iii. Alkaline $KMnO_4$/ Acidified $KMnO_4$/ Acidified $K_2Cr_2O_7$ **(any two)**

iv.

| **Covalent compounds** | **Ionic Compounds** |
|---|---|
| Low melting and boiling points | High melting and boiling points |
| Poor conductors of electricity | Conduct electricity in aqueous solution and molten state. |
| Generally soft if solids | Hard crystalline solids |
| Generally soluble in oil or non-polar solvents | Generally soluble in soluble in water/polar solvents |

OR

a. A series of carbon compounds in which the same functional group substitutes for hydrogen in a carbon chain./A sequence of carbon compounds with same general formula and similar chemical properties
$HCHO, CH_3CHO, C_2H_5CHO$ **(Any two)**

b.
- Add a spatula full of $NaHCO_3/Na_2CO_3$ in a test tube containing unknown solution and shake well
- If evolution of a colourless gas ($CO_2$) takes place the sample is carboxylic acid otherwise it is alcohol.

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

**Section C**

30.

**(b)** B and C

**Explanation:**

A ray of light passing from an optically denser medium to an optically rarer medium bends away from the normal, and a ray of light passing from an optically rarer medium to an optically denser medium bends toward the normal.

31.

**(b)** ∠r, ∠A and ∠D

**Explanation:**

∠r, ∠A and ∠D

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

**Explanation:**

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

33. a. An object is seen only when the light illuminating it is reflected and reach our eye. According to Rayleigh's scattering Law, the intensity of scattered light $\propto \frac{1}{\lambda^4}$. Since yellow colour has small wavelength than red colour, so scattering of yellow colour is more than the red colour. It means signal is illuminated more brightly by the red colour than the yellow colour. Hence, the signals can be seen easily from a longer distance. Therefore, red colour is used for danger signals than yellow colour.

b. In the visible spectrum, violet light have the shortest wavelength.Therefore, it has the highest refractive index. Therefore, when white light is passed through the prism, it split into its seven colours to give visible spectrum and violet colour having the shortest wavelength deviated the most.

34. It is given that potential difference (V) = 220 V.

Resistance of coil A ($R_A$) = Resistance of coil B ($R_B$) = 24 Ω

i. When either coil A or B is used separately, the current (I) $= \frac{V}{R} = \frac{220V}{24\Omega}$

= 9.2 A.

ii. When two coils are used in series, total resistance, $R_S = R_A + R_B$

= $R_A$+ $R_B$ = 24 +24 = 48Ω

Current flowing (I) $= \frac{V}{R_S} = \frac{220V}{48\Omega} = 4.6A$

iii. When the two coils are joined in parallel,total resistance ($R_p$) $= \frac{1}{24} + \frac{1}{24} = \frac{2}{24}$

$R_p$ = 12Ω

Current (I) = V/$R_p$ $= \frac{220V}{12\Omega} = 18.3A$

OR

(i) V = 6V

$R_1$ = 1Ω

$R_2$ = 2Ω

Total resistance, R = $R_1$ + $R_2$

= 1 + 2 = 3Ω

$I = \frac{V}{R}$

$= \frac{6}{3}$

= 2A

Therefore, power ($P_1$) = $I^2R$

$= (2)^2 \times 2$

= 8W

(ii) V = 4V, $R_1 = 12\Omega$, $R_2 = 2\Omega$

$\because$ Potential difference is constant in a parallel circuit. Hence power dissipated across the 2 $\Omega$ resistor is directly given as:

$P_2 = \frac{V^2}{R}$

$= \frac{4\times4}{2}$

= 8W

Ratio $\frac{P_1}{P_2} = \frac{8}{8}$ = 1:1

As an interesting observation might be that power dissipated in parallel circuit does not depend on the resistor connected in parallel,while in a series circuit,as the current flow is determined by all the resistors,power dissipation is dependent on the other resistors in the circuit.

35. i. The magnetic field and hence the magnetic line of force exist in all the planes all around the magnet.
    ii. The relative strength of the magnetic field is shown by the degree of closeness of the field lines and the direction of the magnetic field is obtained by tangent to the field lines at the point of intersect.
36. 1. Functions of following parts of human eye are given below :
        1. Cornea - It is a thin membrane which provides 67% of the eye's focussing power.
        2. Iris - It controls amount of light entering the eye by controlling the size of pupil similar to the aperture of a camera which has capacity to decrease or increase the amount of light entering eye.
        3. Crystalline lens - It helps to focus light on retina for image formation.
        4. Ciliary muscles - It contracts and relax in order to change the lens shape for focussing image at retina. when it contracts the lens become thicker and when it relaxes the lens become flat.
    2. 1. The objective of organising such compaigns is to guide, educate and help those people who are suffering from corneal blindness that they can be cured by corneal replacement surgery.
        2. 1. Come to participate in this campaign because, if someone get his vision through your eyes, it is an incredible help.
        2. As eye is one of the most valuable sense organs through which an individual can achieve so many things in his/her life, so try to realise the situation that these people are sufferinng from.
        3. The persons who actively participate and contribute in such programme are strong hearted and very much helpful for the people living in such situations.
37. i. The magnetic field will be acting in vertically downward direction in accordance with Fleming's left-hand rule. [Direction of the current should be considered in a direction opposite to the direction in which the electrons move].
    ii. Current will definitely be induced in coil B if current is changed in coil A. If current in A is increased, the induced current in B will be in direction opposite to that in A. If current in A is decreased, induced current in B will be in same direction as in A. This change in magnetic field lines around coil B induces an electric current in it. This process is known electromagnetic induction.
38. i. Ohm is the unit of electrical resistance.

ii. According to Ohm's law, there is a relation between the current flowing through a conductor and the potential difference across it. It is given by,
V ∝ I V = IR

iii. $R_3$ resistance has high resistance.

**OR**

The slope of V-I graph at any point represents resistance.

39. Since the image formed is real, hence an inverted image is formed.
size of image, $h_2$ = - 3 cm, size of object $h_1$ = + 2 cm.

Magnification $m = \frac{h_2}{h_1} = \frac{-3}{2} = -1.5$ . Also $m = \frac{-v}{u}$ $or$ $v = -mu$ ..... $(i)$

Here v = - 16 cm ($u$ is always negative)

Substituting in (i), we have $v$ = - (-1.5) (-16) = - 24 cm. or $v$ = - 24 cm.

Image is formed 24 cm to the left of the mirror (Negative sign – Image is towards left of mirror)

To calculate focal length. Here $u$ = = 16 cm, $v$ = - 24 cm, $f$ = ?

Using $\frac{1}{f} = \frac{1}{v} + \frac{1}{u}$ $or$ $\frac{1}{f} = -\frac{1}{24} - \frac{1}{16} = \frac{-2-3}{48} = -\frac{5}{48}$ $or$ $f = -\frac{48}{5} = -9.6$ $cm$

Negative focal length indicates that the mirror is concave.

OR

a. f = 20 cm, u = -30 cm

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

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

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

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

v = 60 cm

ii. Real, inverted and magnified

iii. m = $\frac{v}{u}$

m = $\frac{60}{-30}$

m = -2

h' = m × h

h' = -2 × 5

h' = -10 cm

b.

