Class X Session 2026-27
Subject - Science
Sample Question Paper - **3**

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. The process in which transport of soluble products of photosynthesis takes place in plants is known as: **[1]**

   a) Translocation b) Conduction

   c) Transpiration d) Evaporation

2. In an experiment to study independent inheritance of two separate traits : shape and colour of seeds, the ratio of the different combinations in F_2 progeny would be **[1]**

   a) 1 : 3 b) 1 : 2 : 1

   c) 9 : 1 : 1 : 3 d) 9 : 3 : 3 : 1

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

Column A	Column B
(i) Thyroid gland	(a) Testosterone
(ii) Pancreas	(b) Thyroxin
(iii) Testis	(c) Estrogen
(iv) Ovaries	(d) Insulin and glucagon

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

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

4. The plant hormones promoting rapid cell division in seeds and wilting of leaves respectively are **[1]**

   a) Gibberellins and Auxins b) Abscisic acid and Gibberellins

   c) Auxins and Abscisic acid d) Cytokinins and Abscisic acid

5. In the following groups of wastes, which group contains only non-biodegradable **[1]**

wastes?

a) Used tea leaves, Cardboard box, Iron nail

b) Plastic Syringes, Newspaper, Ball point pen

c) Leather footwear, Plastic plate, Polythene bag

d) Empty medicine bottle, Milk packet, Aluminium can

6. Temporary finger-like extensions on the cell surface to take in food is formed in: **[1]**

a) Leishmania

b) Amoeba

c) Paramoecium

d) Rhizopus

7. Disposable plastic plates should not be used because**:** **[1]**

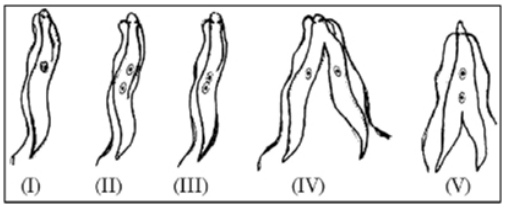
a) They are made of materials with light weight.

b) They are made of biodegradable materials.

c) They are made of toxic materials.

d) They are made of non-biodegradable material.

8. Choose the correct order of the stages of binary fission in Leishmania. **[1]**



a) I, III, V, II, IV

b) I, III, II, V, IV

c) I, II, III, V, IV

d) I, II, III, IV, V

9. **Assertion (A):** The sex of a child in human beings will be determined by the type of chromosome he/she inherits from the father. **[1]**

Reason (R): A child who inherits X chromosome from his father would be a girl (XX), while a child who inherits a Y chromosome from the father would be a boy (XY).

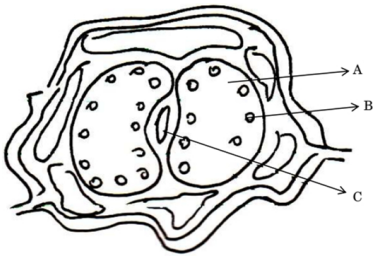
a) Both A and R are true and R is the correct explanation of A.

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. Identify the following diagram and name the parts marked as A, B and C **[2]**



11. Kulhads (disposable cups made of clay) and disposable paper cups both are used as an alternative for disposable plastic cups. Which one of these two can be considered as a better alternative to plastic cups and why? **[2]**

OR

Define a food chain. Design a terrestrial food chain of four trophic levels. If a pollutant enters at the producer level, the organisms of which trophic level will have

the maximum concentration of the pollutant in their bodies? What is this phenomenon called?

12. Why is the use of iodised salt advisable? **[2]**

13. A pure pea plant bearing terminal flowers was cross-pollinated with a pure plant having axillary flowers. In F_1 generation, plants with axial flowers only were obtained. F_1 generation plants are self-pollinated and F_2 generation is obtained. **[3]**

    a. Work out the pattern of inheritance in this case.

    b. What will be the ratio of plants obtained in F_2 generation?

14. What is placenta? Describe its role during pregnancy. **[3]**

15. Leaves of healthy potted plant were coated with vaseline. Will this plant remain healthy for long? Give reasons for your answer. **[4]**

16. a. What is puberty? Write any two changes that occur in boys during early teenage years. **[5]**

    b. List two functions performed by testis in human males.

    Mention one role each of (i) Vas deferens, (ii) Seminal Vesicle (iii) Urethra and (iv) Scrotum in human male reproductive system.

OR

What constitutes the central and peripheral nervous systems? How are the components of central nervous system protected? Which signals will get disrupted in case of a spinal cord injury?

Section B

17. Which of the following statements is not correct? **[1]**

    a) Some metals react with acids to give salt and hydrogen.

    b) Some non metal oxides react with water to form an acid.

    c) All metal oxides react with water to give salt and acid.

    d) All metal carbonates react with acid to give a salt, water and carbon dioxide.

18. Which of the given statement is correct or wrong: **[1]**

Statement A: Acetic acid freezes at 290K.

Statement B: Acetic is also called as glacial acetic acid.

    a) Statement B is True; Statement A is false.

    b) Statement A is true; Statement B is false.

    c) Neither Statement A nor Statement B is true.

    d) Both the statements A and B are true.

19. During electrolytic refining of copper, the anode, the cathode and the electrolyte used respectively are **[1]**

    a) Impure copper, pure copper, acidified copper sulphate solution

    b) Impure copper, pure copper, distilled water

    c) Pure copper, impure copper, sulphuric acid

    d) Pure copper, impure copper, acidified copper sulphate solution

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

Column A	Column B
(i) Ionic bond	(a) NH_3
(ii) Polar covalent bond	(b) C_{60}
(iii) Non-polar bond	(c) N_2
(iv) Fullerene	(d) NaCl

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

21. During smelting, an additional substance is added which combines with impurities to form a fusible product known as: **[1]**



a) Mud
b) Gangue
c) Flux
d) Slag

22. You want to test for hardness of water but hard water is not available in the laboratory. Which of the following compounds may be dissolved in pure water to make it hard? **[1]**

i. Hydrogen Carbonate of Sodium
ii. Sulphate of Magnesium
iii. Chloride of Calcium
iv. Carbonate of Sodium

a) (i) and (ii)
b) (ii) and (iii)
c) (i) and (iv)
d) (iii) and (iv)

23. Which one of the following compounds changes blue litmus to red? **[1]**

a) CH_3COCH_3
b) C_2H_5OH
c) C_2H_5CHO
d) C_2H_5COOH

24. Metal which is liquid at room temperature is**:** **[1]**

a) Sodium
b) Lead
c) Silver
d) Mercury

25. You have been provided with two test tubes. One of them contains distilled water and **[2]**

the other contain acid solution. How will you find out which of the test tube contains water without testing the contents of the test tube?

26. Define a precipitation reaction. Give its example and also express the reaction that occurs in the form of a balanced chemical equation. **[3]**

OR

Explain the following in terms of gain or loss of oxygen with two examples each:

a. Oxidation

b. Reduction

27. i. Which types of metals can be obtained in their pure form by just heating their oxides in air? Give one example. **[3]**

ii. Consider the reaction given below used to obtain Manganese metal in pure form:

$3MnO_2(s) + 4Al(s) \longrightarrow 3Mn(l) + 2Al_2O_3(s) + Heat$

a. What type of reaction is it?

b. What is the role of aluminium in this reaction?

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

The melting points and boiling points of some ionic compounds are given below:

Compound	Melting Point (K)	Boiling Point (K)
NaCl	1074	1686
LiCl	887	1600
$CaCl_2$	1045	1900
CaO	2850	3120
$MgCl_2$	981	1685

These compounds are termed ionic because they are formed by the transfer of electrons from a metal to a non-metal. The electron transfer in such compounds is controlled by the electronic configuration of the elements involved. Every element tends to attain a completely filled valence shell of its nearest noble gas or a stable octet.

i. Show the electron transfer in the formation of magnesium chloride. (1)

ii. What happens at the cathode when electricity is passed through an aqueous solution of sodium chloride? (1)

iii. While forming an ionic compound say sodium chloride how does sodium atom attain its stable configuration? (2)

OR

Why do ionic compounds in the solid state not conduct electricity? (2)

OR

All compounds of carbon which contain only carbon and hydrogen are called hydrocarbons. Among these, saturated hydrocarbons are called 'alkanes', unsaturated compounds with one or more double bonds are called 'alkenes' and compounds containing one or more triple bonds are called 'alkynes'.

a. Identify the following compound and write its name. **(1)**

$CH_3 - C \equiv CH$

b. How do saturated and unsaturated carbon compounds differ in terms of the flame produced by them on burning? **(1)**

c. i. Which type of hydrocarbons undergo addition reactions? Show with an example. **(2)**

OR

ii. What are structural isomers? Draw two structural isomers of butane (C_4H_{10}). **(2)**

29. In an industrial process used for the manufacture of sodium hydroxide, a gas **A** is formed as a by-product. The gas **A** reacts with lime water to give a compound **B** which is used as a bleaching agent in the chemical industry. Identify **A** and **B**. Also give the chemical equations of the reactions involved. **[5]**

OR

An acid **X** and an alcohol **Y** react with each other in the presence of an acid catalyst to form a sweet smelling substance Z. Identify **X**, **Y** and **Z**. Write the chemical equation for the reaction involved and name it. The substance **Z** on treatment with sodium hydroxide produces back the alcohol **Y** and sodium ethanoate. Write the chemical equation for the reaction involved and name it, giving justification for the name.

Section C

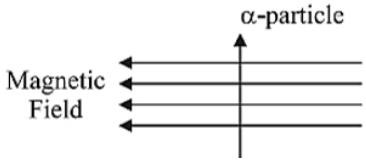
30. When a narrow beam of white light passes through a glass prism it splits into its component colours? This phenomenon is called: **[1]**

a) Scattering of light
b) Dispersion of light
c) Total reflection of light
d) Diffusion of light

31. **Assertion (A):** Refractive index has no units. **[1]**
Reason (R): The refractive index is a ratio of two similar quantities.

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.

32. An alpha particle enters a uniform magnetic field as shown. The direction of motion of the alpha particle is: **[1]**



a) out of the page
b) towards right
c) towards left
d) into the page

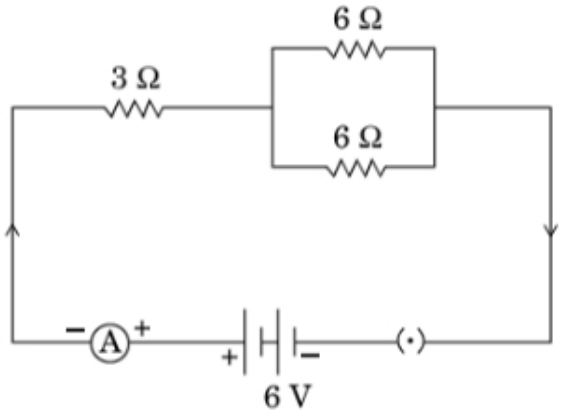
33. An object is placed in front of a concave mirror of focal length 12 cm. If distance of the object from the pole of the mirror is 8 cm, then use mirror formula to determine the position of the image formed. Draw a labelled ray diagram to justify your answer in this case. **[2]**

34. In the given circuit, find: **[2]**

a. Total resistance of the network of resistors

b. Current through ammeter A, and

c. Potential difference across 3 Ω and 6 Ω resistors



OR

a. State the relation correlating the electric current flowing in a conductor and the voltage applied across it. Also draw a graph to show this relationship.

b. Find the resistance of a conductor if the electric current flowing through it is 0.35 A when the potential difference across it is 1.4 V.

35. What are the common defects of vision that can be corrected by the use of suitable eyeglasses or spectacles? **[3]**

36. Resistance of a wire of length 1 m is 35Ω at $20^{\circ}C$. If the diameter of the wire is 0.2 mm, determine the resistivity of the material of the wire at that temperature. How will the resistivity of the wire change if the length and diameter of the wire both are doubled? Justify your answer. **[3]**

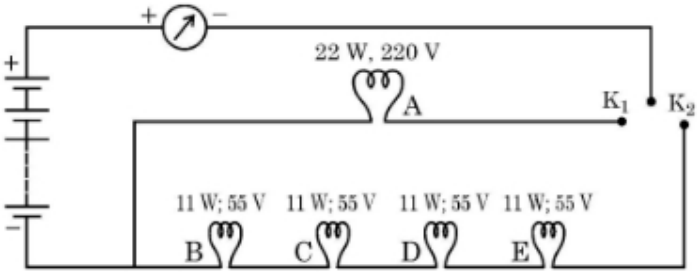
(Given that $\pi = \frac{22}{7}$)

37. a. Draw a labelled diagram to show the pattern of magnetic field lines on a horizontal white board due to a straight current carrying conductor passing perpendicular through its centre. If the direction of current in the conductor is vertically downwards, mark the direction of (i) current, and (ii) magnetic field lines. **[3]**

b. State the right hand thumb rule and check whether the directions marked on the diagram are in accordance with this rule.

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

In a domestic circuit five LED bulbs are arranged as shown. The source voltage is 220 V and the power rating of each bulb is marked in the circuit diagram. Based on the following circuit diagram, answer the following questions:



a. State what happens when **(1)**

i. key K_1 is closed.

ii. key K_2 is closed.

b. Find the current drawn by the bulb B when it glows. **(1)**

c. Calculate

i. the resistance of bulb B, and

ii. total resistance of the combination of four bulbs B, C, D and E. **(2)**

OR

What would happen to the glow of all the bulbs in the circuit when keys K_1 and K_2 both are closed and the bulb C suddenly get fused?

Give reason to justify your answer. **(2)**

39. i. State laws of reflection of light. **[5]**

ii. An object of height 5·0 cm is placed at 15 cm in front of a concave mirror of focal length 10 cm. At what distance from the mirror should a screen be placed, so that a focussed image is obtained on it? Find the height of the image.

OR

An object 6 cm in size is placed at 50 cm in front of a convex lens of focal length 30 cm. At what distance from the lens should a screen be placed in order to obtain a sharp image of the object? Find the nature and size of the image. Also draw labelled ray diagram to show the image formation in this case.

Solution

Section A

1. **(a)** Translocation
   Explanation:
   Translocation

2. **(d)** 9 : 3 : 3 : 1
   Explanation:
   9 : 3 : 3 : 1

3. **(d)** (i) - (b), (ii) - (d), (iii) - (a), (iv) - (c)
   Explanation:
   - Thyroxin is secreted by the thyroid gland to regulate the metabolic rate and help control body temperature.
   - Insulin and glucagon are hormones that help regulate the levels of blood glucose in the body secreted by the pancreas.
   - The testes are the most essential organs of the male reproductive system. They are the glands where sperm and testosterone are produced.
   - Estrogen is a female steroid hormone that is produced by the ovaries.

4. **(d)** Cytokinins and Abscisic acid
   Explanation:
   Cytokinins and Abscisic acid

5. **(d)** Empty medicine bottle, Milk packet, Aluminium can
   Explanation:
   Empty medicine bottles, Milk packets, Aluminium cans

6. **(b)** Amoeba
   Explanation:
   Amoeba

7. **(d)** They are made of non-biodegradable material.
   Explanation:
   Disposable plastic plates should not be used because they are made of non-biodegradable material. Non-biodegradable substances may be inert, are not broken down and persist in the environment for a long time. They may thus cause harm to the various members of the ecosystem.

8. **(b)** I, III, II, V, IV
   Explanation:
   In Leishmania binary fission occurs in a definite orientation:
   i. A constriction in the cell membrane first appears after nuclear division.

ii. Inwardly transversely from the centre of the dividing cell, the membrane expands.
iii. The cytoplasm divides into two equal pieces, each with a single nucleus
iv. The daughter cells can split off and create two new creatures.

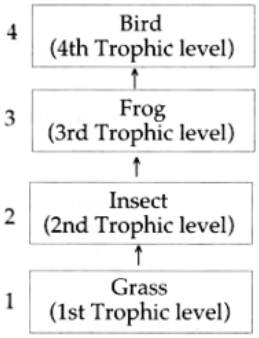
9. **(a)** Both A and R are true and R is the correct explanation of A.
Explanation:
Both A and R are true and R is the correct explanation of A.

10. Stomata
A. Guard Cell
B. Chloroplast
C. Stoma

11. Use of Plastic cups raised the concern towards hygiene thus they were replaced by disposable plastic cups.
Plastic cups are non-biodegradable and harm the environment friendly. They were thus replaced by Kulhads.
Making Kulhad made of clay on a large scale resulted in the loss of top fertile soil.
Now, disposable paper cups are used because - the paper can be recycled, it is biodegradable and is eco-friendly material which does not cause environmental pollution.

OR

It is the sequence of arrangement of living organisms in a community in which one organism consumes another organism to transfer food energy.

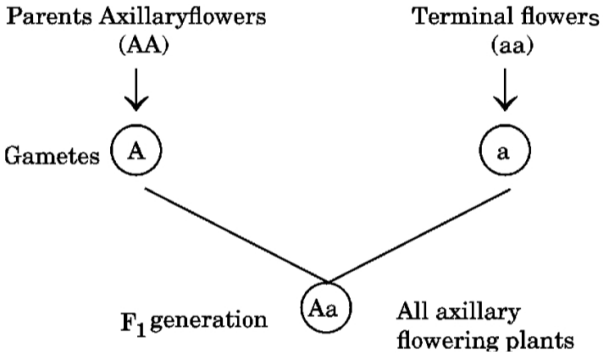


Grass ⟶ Insect ⟶ Frog ⟶ Bird

The organism at higher tropic level will have the maximum concentration of pollutants. This phenomenon is called biological magnification.

12. Iodine is required by the thyroid gland to make thyroxine hormone. Iodised salt provides iodine needed by thyroid gland to make sufficient thyroxin for our body. The use of iodised salt prevents risk of goitre.

13. a.



F_2 generation Aa × Aa

	A	a
A	AA Axillary	Aa Axillary
a	Aa Axillary	aa Terminal

b. Ratio: 3 : 1 (Axillary : Terminal)

14. Placenta is a special tissue which provides nutrition to the embryo from the mother's blood.
Role:
i. Provides a large surface area to transport glucose and O_2 from mother's blood to embryo.

15. If leaves of a healthy potted plant are coated with vaseline, it will clog the stomatal pores on leaves. Blockage of stomatal will stop transpiration and exchange of gases from leaves. Transpiration plays an important role in ascent of sap in plants. Hence, lack of transpiration will stop ascent of sap. Moreover, stoppage of exchange of gases would also stop respiration and photosynthesis in leaves. This will result in death of leaves and finally the plant would die due to lack of food.

16. a. When the rate of general body growth begins to slow down and reproductive tissue begins to mature.
In boys - New thick hair growth on face, voice begins to crack, penis begins to enlarge and become erect.

b. Testis - Formation of sperms, Secretion of hormone testosterone
Role of:
i. Vas deferens - Delivery of sperms from testes to urethra.
ii. Seminal vesicle - Provides nutrition to sperms /makes the transport(movement) of sperms easier.
iii. Urethra - Common passage for sperms and urine.
iv. Scrotum - Providing required temperature for sperm formation

OR

Central - Brain and Spinal cord: The central nervous system consists of the brain and spinal cord. The brain is the control center of the nervous system and is responsible for processing sensory information, initiating voluntary movements, regulating involuntary functions (such as heartbeat and respiration), and higher cognitive functions (such as thinking, memory, and emotions).

Peripheral - cranial nerves and spinal nerves: The peripheral nervous system consists of all the nerves and ganglia (clusters of nerve cell bodies) outside of the brain and spinal cord. The PNS connects the central nervous system to the rest of the body, including muscles, glands, and sensory organs.

- **Protection of the Components of the Central Nervous System:**

- The brain is protected by the skull, a hard and bony structure that surrounds and encases the brain tissue, providing physical protection against external trauma.
- The spinal cord is surrounded by a series of protective membranes called meninges, which provide additional cushioning and support. The three layers of meninges are the dura mater (outer layer), arachnoid mater (middle layer), and pia mater (inner layer).
- **Signals Disrupted in Case of Spinal Cord Injury:**
- A spinal cord injury disrupts the transmission of nerve signals between the brain and the rest of the body, leading to various impairments depending on the location and severity of the injury.
- Motor signals: Damage to the spinal cord can result in paralysis or weakness of muscles below the level of injury, leading to loss of voluntary movement and control.
- Sensory signals: Spinal cord injury can also cause loss of sensation, including touch, temperature, and proprioception (awareness of body position and movement).

Section B

17.

(c) All metal oxides react with water to give salt and acid.

Explanation:

Metal oxides are basic in nature. They give alkaline solution when dissolved in water.

18.

(d) Both the statements A and B are true.

Explanation:

The freezing point of ethanoic acid is 17^{o} C (290 K). When ethanoic acid (acetic acid) is cooled, it freezes to form a colourless, ice-like solid. The solid looks like a glacier and hence pure ethanoic acid are also called glacial ethanoic acid (or glacial acetic acid).

19. **(a)** Impure copper, pure copper, acidified copper sulphate solution

Explanation:

Impure copper, pure copper, acidified copper sulphate solution

20.

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

Explanation:

- **NaCl** has **ionic bonds** between the sodium ion and the chloride ion.
- **Ammonia** has **polar covalent bonds** between the nitrogen atom and hydrogen atoms.
- **Nitrogen** molecule has **non-polar covalent bonds** between the two nitrogen atoms since the two atoms are alike.
- $\mathbf{C_{60}}$ is a member of **fullerenes** (Allotropes of carbon). Buckminsterfullerene contains a cluster of 60 carbon atoms joined together to form spherical molecules.

21.

(d) Slag

Explanation:

During the smelting of iron, limestone is added as a flux. The temperature inside the blast furnace decomposes limestone to calcium oxide which removes silicate impurity. Impurities like silicon are passed into the slag. The metal is separated from the molten slag.

$CaCO_3 \rightarrow CaO + CO_2$

$CaO + SiO_2 \rightarrow CaSiO_3$ (Slag)

22.

(c) (i) and (iv)

Explanation:
(i) and (iv)

23.

(d) C_2H_5COOH

Explanation:
C_2H_5COOH

24.

(d) Mercury
Explanation:
Mercury is a liquid at room temperature. Lead, sodium, and silver are solids.

25. Take two blue litmus paper strips and one by one dip in both test tubes A and B. The one which changes the colour of the litmus paper to red it is acid and the one which shows no change in color is water.
26. Any reaction in which a precipitate (insoluble substance) is formed is called a precipitation reaction.
Example: when sodium sulphate solution is added to the barium chloride solution a white precipitate of barium sulphate is formed.
$Na_2SO_4\ (aq) + \ BaCl_2(aq) \longrightarrow \underset{ppt}{BaSO_4}\ (s) + \ 2NaCl(aq)$

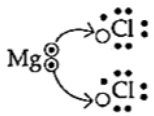
OR

Oxidation- Addition of oxygen or removal of hydrogen in a chemical reaction is called oxidation reaction. For example:
$2Cu + O_2 \rightarrow 2CuO$
$4Al + 3O_2 \rightarrow 2Al_2O_3$
Reduction- Addition of hydrogen or removal of oxygen in a chemical reaction is called reduction reaction. For example:
$CuO + H_2 \rightarrow Cu + H_2O$
$H_2S + Cl_2 \rightarrow 2HCl + S$

27. i. Metals low in activity series can be reduced to pure metals just by heating their oxides in presence of air, example mercury (Hg):
$\underset{\text{Mercurous oxide}}{2HgO(s)} \xrightarrow{\text{Heat}} \underset{\text{Mercury}}{2Hg(l)} + O_2(g)$

ii. a. The given reaction is a displacement reaction.
b. Aluminium is more reactive than manganese used as a reducing agent, as Al is capable of replacing Mn from MnO_2.

28. i. Transfer of electrons during the creation of magnesium chloride.





ii. When electricity is passed through a solution of sodium chloride in water, hydrogen gas is released twice as much as oxygen gas is released at the anode.
iii. Sodium atom has one electron in its outermost shell. If it loses the electron from its M shell then its L shell now becomes the outermost shell and that has a stable octet. The nucleus of this atom still has 11 protons but the number of electrons has become 10, so there is a net positive charge giving us a sodium cation Na^+. On the other hand chlorine has seven electrons

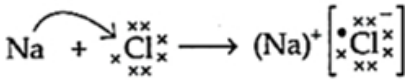
in its outermost shell and it requires one more electron to complete its octet. If sodium and chlorine were to react, the electron lost by sodium could be taken up by chlorine. After gaining an electron, the chlorine atom gets a unit negative charge, because its nucleus has 17 protons and there are 18 electrons in its K, L and M shells. This gives us a chloride anion Cl^-.

$$\underset{2,8,1}{Na} \longrightarrow \underset{2,8}{Na^+} + e^-$$

(Sodium catton)

$$\underset{2,8,7}{Cl} + e^- \rightarrow \underset{2,8,8}{Cl^-}$$

(chloride anion)



OR

The conduction of electricity through a solution involves the movement of charged particles. A solution of an ionic compound in water contains ions, which move to the opposite electrodes when electricity is passed through the solution. Ionic compounds in the solid state do not conduct electricity because movement of ions in the solid is not possible due to their rigid structure. But ionic compounds conduct electricity in the molten state. This is possible in the molten state since the elecrostatic forces of attraction between the oppositely charged ions are overcome due to the heat. Thus, the ions move freely and conduct electricity.

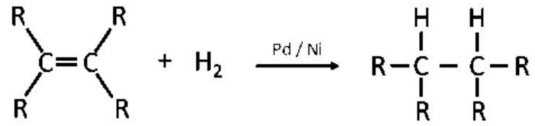
OR

a. Propyne

b. Saturated carbon compounds produce blue/clean flame.
Unsaturated compounds produce yellow/sooty flame.

c. i. Unsaturated hydrocarbons undergo addition reactions

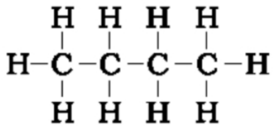
Example

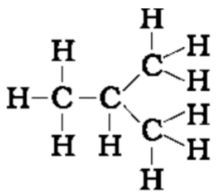


(or any other example)

OR

ii. Compounds with identical molecular formula but different structural formula or structures are called structural isomers.





29. In the manufacture of sodium hydroxide (Chlor-alkali process), hydrogen gas and chlorine gas are formed as by-products. The chemical equation for the reaction is as follows:-

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

Gas 'A', which is formed as by-product and which also reacts with lime water (calcium hydroxide) to form calcium oxy-chloride is thus, chlorine. Gas A is not hydrogen. Calcium oxy-chloride is used as a bleaching agent in the chemical industry. The chemical equation for the formation of calcium oxy-chloride is as follows:-

$$Ca(OH)_2(s) + Cl_2(g) \rightarrow CaOCl_2(s) + H_2O(l)$$

Therefore, gas '**A**' is **chlorine gas** (Cl_2) and '**B**' is **calcium oxy-chloride** (bleaching powder).

OR

X $\longrightarrow$ a carboxylic acid

Y $\longrightarrow$ an alcohol

Z $\longrightarrow$ ester compound

Chemical reaction involve is:

$CH_3COOH + C_2H_5OH \longrightarrow CH_3COOC_2H_5 + H_2O$

This reaction is called esterification.

When the substance **Z** treated with sodium hydroxide produces back the alcohol **Y** and sodium ethanoate

the chemical reaction is as follows:

$CH_3COOC_2H_5 + NaOH \longrightarrow CH_3COONa + C_2H_5OH$

Section C

30.

(b) Dispersion of light

Explanation:

Dispersion of light

31. **(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.

32. **(a)** out of the page

Explanation:

According to Fleming's Left-Hand Rule, the current flows in the direction of the alpha particle, the field points in the direction of the paper's left side, and the force is directed out of the paper by the thumb.

33. Here f = -12 cm, u = -8 cm, v = ?

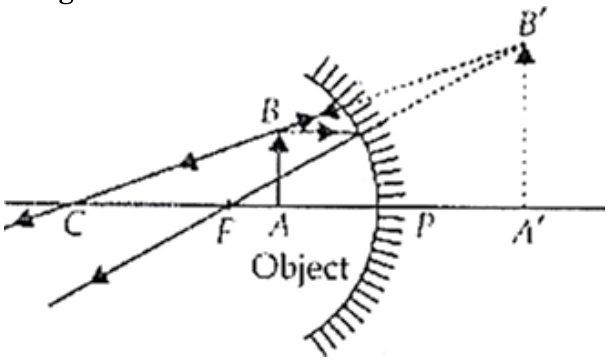
Mirror formula $\frac{1}{v} + \frac{1}{u} = \frac{1}{f}$

$\therefore \frac{1}{v} = \frac{1}{f} - \frac{1}{u} = \frac{1}{-12 \text{ cm}} - \frac{1}{-8 \text{ cm}}$

$= +\frac{1}{24 \text{ cm}}$

v = +24 cm

Image is formed at 24 cm behind the mirror.



34. a. $X_1 = 3\ \Omega; X_2 = 3\ \Omega$

$\frac{1}{x_2} = \frac{1}{6} + \frac{1}{6} = \frac{2}{6} = \frac{1}{3}$

Total resistance $R = X_1 + X_2 = 3\ \Omega + 3\ \Omega = 6\ \Omega$

b. Current through ammeter A, $I = \frac{V}{R} = \frac{6V}{6\Omega} = 1\ A$

c. Potential difference across $3\ \Omega = 1A \times 3\ \Omega = 3\ V$

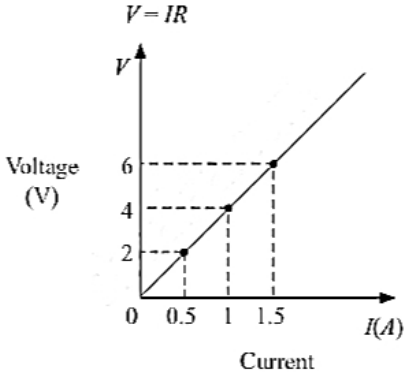
Potential difference across $6\Omega = \frac{1}{2}\ A \times 6\Omega = 3\ V$

OR

a. V is directly proportional to I

V = IR This is called as Ohm's law.

Graph:



b. Given:
Potential Difference (V) = 1.4 V
Current (I) = 0.35 A
Now,
V = IR
so, R = $\frac{V}{I} = \frac{1.4}{0.35}$ = 4 ohm
Hence, the resistance of a conductor will be 4 ohm.

35. There are mainly four common defect of vision that can be corrected by the use of suitable eyeglasses or spectacles. There are
   i. Myopia or near-sightedness,
   ii. Hypermetropia or far-sightedness,
   iii. Presbyopia, and
   iv. Astigmatism

36. $R = 35\Omega$

Diameter $(2r) = 0.2\ mm = 2 \times 10^{-4}\ m \therefore r = 10^{-4}\ m$

Length of the wire $= 1\ m$

$R = \rho\frac{l}{A}$

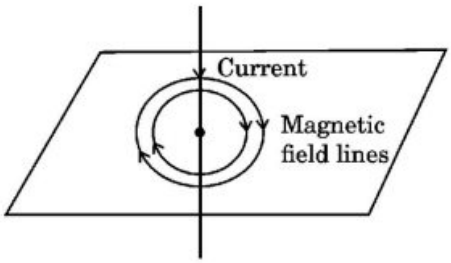
Area of cross section, $A = \pi r^2$

Resistivity, $\rho = \frac{RA}{l} = \frac{35 \times \frac{22}{7} \times \left(10^{-4}\right)^2}{1}$

$= 110 \times 10^{-8}\Omega\ m$

Resistivity of the wire will not change as it is a characteristic property of the material which does not depend on the dimensions of the wire.

37. a.



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

38. a. i. Bulb A glows
ii. Bulbs B, C, D and E glow

b. P = V × I
11 = 55 × I
I = $\frac{1}{5}$ = 0.2 amp

c. i. Resistance of bulb B, $R = \frac{V}{I} = \frac{55\ V}{0.2\ A} = 275\Omega$

ii. Total resistance of the series combination of four bulbs

$= 4 \times 275 = 1100\Omega$

OR

Bulb A will keep glowing with same brightness.

Other bulbs i.e., B, D and E will stop glowing.

Reason:

As the bulbs B, D and E are connected in series with fused bulb C, so no current flows through them and thus they will not glow. The bulb A remains unaffected as it is connected in parallel combination.

39. i. The angle of incidence is equal to the angle of reflection.

The incident ray, the normal to the mirror at the point of incidence and the reflected ray, all lie in the same plane.

ii. u = -15 cm, f = -10 cm (concave mirror)

h = 5.0 cm

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

$\frac{1}{v} = \frac{-1}{10\ cm} + \frac{1}{15\ cm} = \frac{-1}{30\ cm}$

or v = -30 cm. The screen must be placed at a distance of 30 cm from the mirror in front of it

$(m) = \frac{h'}{h} = -\frac{v}{u}$

$h = \frac{-v}{u} \times h = -\frac{-30\ cm}{-15\ cm} \times 5\ cm = -10\ cm$

OR

Given,

f = 30cm

u = - 50 cm

h = 6cm

Lens formula

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

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

$\frac{1}{v} = \frac{1}{30} - \frac{1}{50}$

$v = +75\ cm$

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

$\frac{75}{-50} = \frac{h_1}{6}$

h_i = -9cm

The image formed is real, increased and enlarged.

