Solved Paper 2019
Science
CLASS-X

Time : 3 Hours

Max. Marks : 80

General Instructions:

(i) The questions paper comprises *five* Sections A, B, C, D and E. You are to attempt all the sections.

(ii) All questions are **compulsory.**

(iii) Internal choice is given in sections B, C, D and E.

(iv) Question numbers **1** and **2** in Section A are one mark questions. They are to be answered in **one** word or in **one** sentence.

(v) Question numbers **3** to **5** in Section B are two marks questions. These are to be answered in about **30** words each.

(vi) Question numbers **6** to **15** in Section C are three marks question. These are to be answered in about **50** words each.

(vii) Question numbers **16** to **21** in Section D are *five* marks questions. These are to be answered in about **70** words each.

(viii) Question numbers **22** to **27** in Section E are based on practical skills. Each question is a **two** marks question. These are to be answered in brief.

Delhi Set I

Code No. 31/1/1

SECTION - A

1. What is the function of a galvanometer in a circuit ?

1

Ans. Detect the presence or direction of current.

(CBSE Marking Scheme, 2019)

2. Why is biogas considered an excellent fuel ? **1**

Ans. It burns completely/ burns without smoke / high calorific value. **1**

(CBSE Marking Scheme, 2019)

SECTION - B

* 3. How it can be proved that the basic structure of the Modern Periodic Table is based on the electronic configuration of atoms of different elements ? **2**

OR

The electronic configuration of an element is 2, 8, 4. State its:

(a) group and period in the Modern Periodic Table.

(b) name and write its one physical property.

4. Write two different ways in which glucose is oxidized to provide energy in human body. Write the products formed in each case. **2**

Ans. • Aerobic / Presence of oxygen ½

  Product – CO_2 and H_2O ½

• Anaerobic / Absence of oxygen ½

  Product – Lactic acid ½

(CBSE Marking Scheme, 2019)

5. Define the term power of accommodation. Write the modification in the curvature of the eye lens which enables us to see the nearby objects clearly ?

2

Ans. • Power of accommodation – Ability of eye lens to adjust its focal length. **1**

• Curvature increases/lens becomes thick. **1**

(CBSE Marking Scheme, 2019)

SECTION - C

6. 2 g of silver chloride is taken in a china dish and the china dish is placed in sunlight for sometime. 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. **3**

OR

Identify the type of reactions taking place in each of the following cases and write the balanced chemical equation for the reactions.

(a) Zinc reacts with silver nitrate to produce zinc nitrate and silver.

(b) Potassium iodide reacts with lead nitrate to produce potassium nitrate and lead iodide.

Ans. • White silver chloride turns grey in sunlight **1**

• $2AgCl \xrightarrow{\text{Sunlight}} 2\,Ag + Cl_2$ **1**

• Decomposition reaction / Photolytic decomposition **1**

(CBSE Marking Scheme, 2019) 1×3=3

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* *Out of Syllabus*

OR

(a) Displacement reaction		½
$Zn + 2AgNO_3 \longrightarrow Zn\,(NO_3)_2 + 2\,Ag$		**1**
(b) Double displacement reaction		½
$2KI + Pb(NO_3)_2 \longrightarrow PbI_2 + 2KNO_3$		
(deduct ½ mark for non balanced equation)		**1**

(CBSE Marking Scheme, 2019)

7. **Identify the acid and the base from which sodium chloride is obtained. Which type of salt is it ? When is it called rock salt ? How is rock salt formed ?** 3

Ans. • Acid – Hydrochloric acid/HCl		½
Base – Sodium hydroxide/NaOH		½
• Neutral Salt		½
• When it forms brown crystals combined with impurities		½
• Drying up of seas		**1**

(CBSE Marking Scheme, 2019)

*   **8.** **Based on the group valency of elements write the molecular formula of the following compounds giving justification for each:**

  (i) **Oxide of first group elements.**

 (ii) **Halide of the elements of group thirteen, and**

(iii) **Compound formed when an element, A of group 2 combines with an element B of group seventeen.** 3

 9. **Write three types of blood vessels. Give one important feature of each.** 3

Ans. • Arteries – No valves/thick walled/carry oxygenated blood/carry blood away from heart. **1**

• Veins – Presence of valves/thin walled/carry deoxygenated blood/carry blood towards heart. **1**

• Capillaries – Very fine/mixed blood/found in tissues/sites for material exchange. **1**

(CBSE Marking Scheme, 2019)

10. **Trace the sequence of events which occur when a bright light is focused on your eyes.** 3

Ans. Receptor cells of eyes/retina $\longrightarrow$ Sensory neuron $\longrightarrow$ Brain / CNS

$\downarrow$

Pupil contracts / Eye lids close/$\longleftarrow$ Eye muscles $\longleftarrow$ Motor neuron Blink. ½ × 6=3

(Note : If a child writes spinal cord in place of brain give full credit to him/her)

(CBSE Marking Scheme, 2019)

11. **What are plant hormones ? Name the plant hormones responsible for the following:**

  (i) **Growth of stem**

 (ii) **Promotion of cell division**

(iii) **Inhibition of growth**

(iv) **Elongation of cells** 3

Ans. Plant hormones – Chemical substances which help the plant to coordinate growth and development **1**

  (i) Auxins/ Gibberellins

 (ii) Cytokinins

(iii) Abscisic acid / ABA

(iv) Auxins/ Gibberellins ½ × 4=2

(CBSE Marking Scheme, 2019)

12. **Name the plant Mendel used for his experiment. What type of progeny was obtained by Mendel in F_1 and F_2 generations when he crossed the tall and short plants ? Write the ratio he obtained in F_2 generation plants.** 3

OR

List two differences between acquired traits and inherited traits by giving an example of each.

Ans. • Pea Plant / Garden pea / *Pisum sativum* **1**

• F_1 – All tall; F_2 – Tall and short ½ + ½

• Ratio – Tall : Short

3 : 1 / 1 : 2 : 1 **1**

(CBSE Marking Scheme, 2019) 1×3=3

OR

|	Acquired Trait	Inherited Trait
1.	These traits are not transferred from one generation to the next generation.	These traits are transferred from one generation to the next.
2.	They do not bring about change in DNA. **Example :** Acquiring any skill.	They bring about changes in DNA. **Example :** Eye colour.

(or any other relevant point and example)

(CBSE Marking Scheme, 2019)

13. **What is a rainbow ? Draw a labelled diagram to show the formation of a rainbow.** 3

Ans. Rainbow – A natural spectrum of sunlight appearing in the sky after a rain shower. **1**
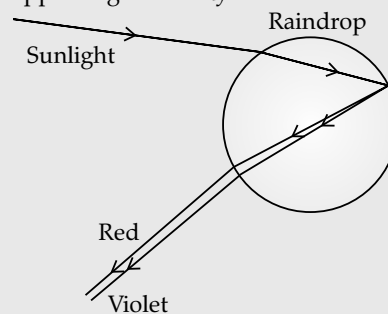
(CBSE Marking Scheme, 2019) 1+2=3

14. **How can we help in reducing the problem of waste disposal ? Suggest any three methods.** 3

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* *Out of Syllabus*

OR

Define an ecosystem. Draw a block diagram to show the flow of energy in an ecosystem.

Ans. Segregation of waste; Recycling; Composting: Reducing the use of non – biodegradable material : Reuse. **(Any three) 1 × 3 = 3**
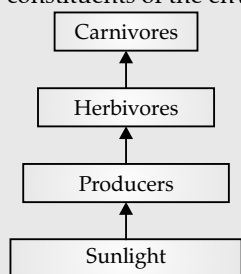**(CBSE Marking Scheme, 2019)**

OR

Detailed Answer:

Methods to reduce the problem of waste disposal are:

(i) By minimizing the use of non-biodegradable substances.

(ii) By following the principle of 3 Rs-reducing, reusing and recycling.

(iii) By segregating and disposing biodegradable and non-biodegradable substances separately.

The system where all the living organisms in an area together interact with the non – living constituents of the environment. **1**

Carnivores
↑
Herbivores
↑
Producers
↑
Sunlight

2
(CBSE Marking Scheme, 2019)

Detailed Answer:

An ecosystem can be defined as a functional unit of nature, where living organisms interact among themselves and with the surrounding physical environment.
Diagram to show the flow of energy in an ecosystem : Assuming 10,000 J of energy is available to the producers, then 1000 J will be available to the primary consumers, 100 J will be available to secondary consumers and 10 J will be available to tertiary consumers.

Tertiary consumer — 10 J
Secondary consumer — 100 J
Primary consumer — 1000 J
Producer — 10000 J
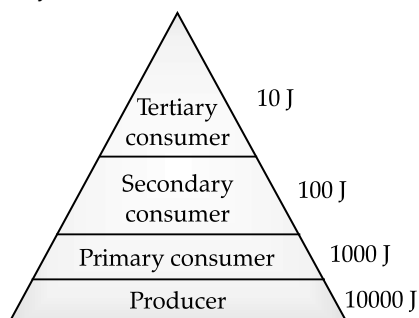
15. What is water harvesting ? List two main advantages associated with water harvesting at the community level. Write two causes for the failure of sustained availability of groundwater. **3**

Ans. • A technique used to collect and store water for future use. **1**
• Advantages – Available resource in time of need. Recharging the ground water level. ½ + ½
• Causes – Overuse of ground water
Deforestation ½ + ½
(CBSE Marking Scheme, 2019) 1×3=3

SECTION - D

16. (a) List in tabular form three chemical properties on the basis of which we can differentiate between a metal and a non-metal. **5**
(b) Give reasons for the following:
(i) **Most metals conduct electricity well.**
(ii) **The reaction of iron (III) oxide [Fe_2O_3] with heated aluminium is used to join cracked machine parts.**

Ans. (a)

	Metals	Non-metals
1.	Metals form basic oxides with oxygen.	Non – metals form acidic or neutral oxides with oxygen.
2.	Metals react with dilute acids to liberate hydrogen.	Non metals do not displace hydrogen from dilute acids.
3.	Metals form positively charged ions by losing electrons.	Non metals form negatively charged ions by gaining electrons.

3

(b) (i) Metals have loosely bound electrons / Loose electrons easily / free electrons **1**
(ii) Molten iron produced during reaction joins the cracked machine parts. **1**
(CBSE Marking Scheme, 2019) 3+1+1=5

17. Write the chemical formula and name of the compound which is the active ingredient of all alcoholic drinks. List its two uses. Write chemical equation and name of the product formed when this compound reacts with:
(i) sodium metal
(ii) hot concentrated sulphuric acid. **5**
OR
What is methane ? Draw its electron dot structure. Name the type of bonds formed in this compound. Why are such compounds:
(i) poor conductors of electricity ? and
(ii) have low melting and boiling points ? What happens when this compound burns in oxygen ?

Ans. Ethanol with chemical formula : CH_3CH_2OH is an active ingredient of all alcoholic drinks. **1**
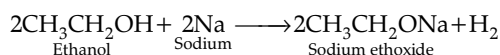
Two uses are:

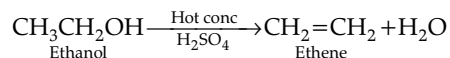**(a)** It is used in the manufacture of paints and varnishes.

(b) It is used in medical swabs and hand sanitizers.

Chemical reactions of ethanol:

(i) With sodium metal:

$$2\underset{\text{Ethanol}}{CH_3CH_2OH} + \underset{\text{Sodium}}{2Na} \longrightarrow \underset{\text{Sodium ethoxide}}{2CH_3CH_2ONa} + H_2$$

(ii) With hot concentrated sulphuric acid:

$$\underset{\text{Ethanol}}{CH_3CH_2OH} \xrightarrow[H_2SO_4]{\text{Hot conc}} \underset{\text{Ethene}}{CH_2{=}CH_2} + H_2O$$

OR

Ans. Methane is a colourless and highly flammable gas produced on decomposition of vegetation naturally in marshlands. It is the simplest hydrocarbon (CH_4).

Electron dot structure:
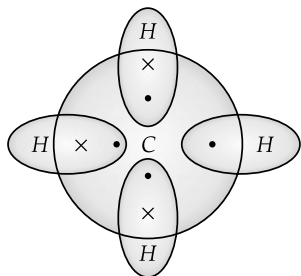
All the bonds present between four hydrogen atoms and one carbon atom at the center are covalent bonds.

(i) Methane is a poor conductor of electricity as all the bonds present are covalent bonds. Hence, no free electrons are available for conduction of electricity.

(ii) As force of attraction between the molecules are not very strong in covalently bonded carbon compounds, therefore, methane being a covalent compound has very low melting and boiling point.

When methane burns in oxygen, carbon dioxide, water and large amount of heat is released.

$$CH_4 + 2O_2 \rightarrow CO_2 + 2H_2O + \text{heat}$$
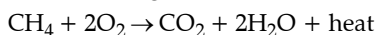
18. **Define pollination. Explain the different types of pollination. List two agents of pollination. How does suitable pollination lead to fertilisaton ?** **5**

OR

(a) Identify the given diagram. Name the parts 1 to 5.

(b) What is contraception ? List three advantages of adopting contraceptive measures.
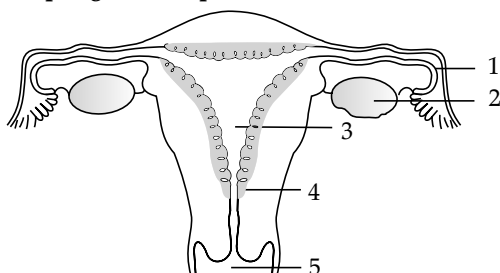
Ans. • Pollination – Transfer of pollen from anther / stamen to stigma of the flower. **1**
• Types of pollination –
  (a) Self pollination – Transfer of pollen from anther / stamen to stigma occurs in the same flower. **½ + ½**
  (b) Cross pollination – Pollen is transferred from anther / stamen of one flower to stigma of another flower. **½ + ½**
• Agents of pollination – Wind, Water, Insects and Animals. **(Any two) ½ + ½**
• A tube grows out of the pollen grain and travels through the style, to reach the female germ cell in the ovary to cause fertilization. **1**

(CBSE Marking Scheme, 2019)

OR

(a) • Female reproductive system **½**
  • Name of parts –
   1 : Fallopian tube/Oviduct
   2 : Ovary
   3 : Uterus
   4 : Cervix
   5 : Vagina **½ × 5**
(b) • Method to avoid pregnancy **½**
  • **Advantages:**
   - Proper gap between two pregnancies
   - Avoiding unwanted pregnancy
   - Keeping population under control
   (CBSE Marking Scheme, 2019) ½ × 3

19. **An object is placed at a distance of 60 cm from a concave lens of focal length 30 cm.** **5**
(i) Use lens formula to find the distance of the image from the lens.
(ii) List four characteristics of the image (nature, position, size, erect/inverted) formed by the lens in this case.
(iii) Draw ray diagram to justify your answer of part (ii).

Ans. (i) $u = -60$ cm, $f = -30$ cm, $v = ?$

$$\frac{1}{f} = \frac{1}{v} - \frac{1}{u}$$ **½**

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

$$= \frac{1}{(-30\,\text{cm})} + \frac{1}{(-60\,\text{cm})} = \frac{-3}{60}$$
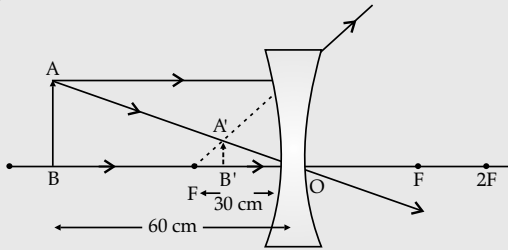
$$\therefore \qquad v = -20 \text{ cm} \qquad \textbf{1}$$

$$m = \frac{v}{u} = \frac{-20\text{cm}}{-60\text{cm}} = \frac{1}{3} \qquad \text{½}$$

Distance of the image will be 20 cm in front of lens. **½**

(ii) Nature: Virtual ½
Position: 20 cm from lens on the same side as the object ½
Size: Diminished ½
Erect/Inverted: Erect

(iii)

(CBSE Marking Scheme, 2019)

20. (a) With the help of a suitable circuit diagram prove that the reciprocal of the equivalent resistance of a group of resistances joined in parallel is equal to the sum of the reciprocals of the individual resistances.

(b) In an electric circuit two resistors of 12Ω each are joined in parallel to a 6 V battery. Find the current drawn from the battery. **5**
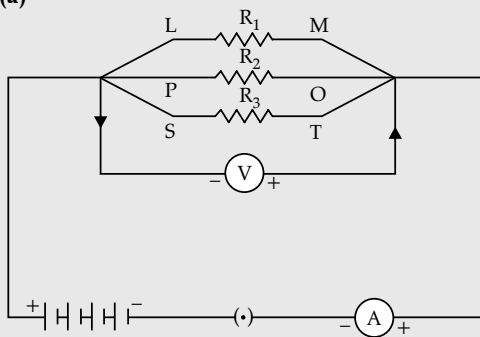
OR

An electric lamp of resistance 20Ω and a conductor of resistance 4Ω are connected to a 6V battery as shown in the circuit. Calculate:

(a) the total resistance of the circuit.
(b) the current through the circuit.
(c) the potential difference across the (i) electric lamp and (ii) conductor, and
(d) power of the lamp.
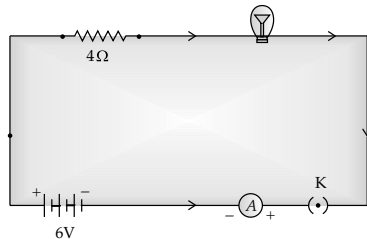
Ans. (a)

From figure:

$$I = I_1 + I_2 + I_3$$

$$I_1 = \frac{V}{R_1}, I_2 = \frac{V}{R_2}, I_3 = \frac{V}{R_3}$$

∴ $$\frac{V}{R_p} = \frac{V}{R_1} + \frac{V}{R_2} + \frac{V}{R_3}$$ 1

$$\frac{1}{R_p} = \frac{1}{R_1} + \frac{1}{R_2} + \frac{1}{R_3}$$ 1

(b) $R_1 = R_2 = 12\ \Omega$ $\qquad V = 6$ V

$$\frac{1}{R_P} = \frac{1}{R_1} + \frac{1}{R_2} = \frac{1}{12} + \frac{1}{12}$$ ½

∴ $$R_p = 6\ \Omega$$ ½

$$I = \frac{V}{R_p} = \frac{6V}{6V} = 1A$$ 1

(CBSE Marking Scheme, 2019)

OR

(a) $$R = R_1 + R_2$$ 1
$$= 20\ \Omega + 4\ \Omega = 24\ \Omega$$

(b) $$I = \frac{V}{R}$$

$$= \frac{6V}{24\Omega} = 0.25\ A$$ 1

(c) (i) For electric lamp:

$$V = IR$$

$$= \frac{6}{24} \times 20 = 5\ V$$ 1

(ii) For Conductor:
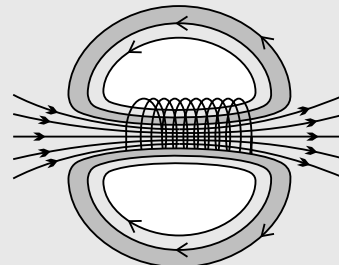
$$V = IR$$

$$= \frac{6}{24} \times 4 = 1\ V$$ 1

(d) $$P = VI$$

$$= 5V \frac{6}{24} A = 1.25\ W.$$ 1

(CBSE Marking Scheme, 2019)

21. What is a solenoid ? Draw the pattern of magnetic field lines of (i) a current carrying solenoid and (ii) a bar magnet. List two distinguishing features between the two fields. **5**
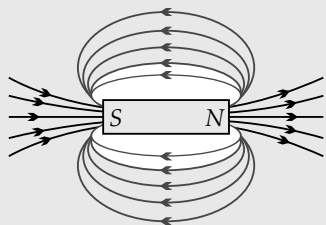
Ans. • A coil of many turns of insulated copper wire wrapped closely in the shape of a cylinder. **1**

(i)

1

(ii)

1

- **Distinguishing features:**

	Solenoid	Bar Magnet
1.	Field disappear on stopping the current.	No effect of current on field.
2.	Strength of the field can be changed by changing the current.	Strength cannot be changed.
3.	Direction can be reversed by changing the direction of current through it.	Direction is fixed and cannot be reversed.

(Any two features) 2
(CBSE Marking Scheme, 2019)

SECTION - E

22. Blue litmus solutions is added to two test tubes A and B containing dilute HCl and NaOH solution respectively. In which test tube a colour change will be observed ? State the colour change and give its reason. **2**

OR

What is observed when 2 mL of dilute hydrochloric acid is added to 1 g of sodium carbonate taken in a clean and dry test tube ? Write chemical equation for the reaction involved.

Ans. Dilute HCl (Tube A) being acidic in nature will change the colour of blue litmus solution to red. There will be no change in the Tube B containing NaOH solution as NaOH is basic in nature.

OR

- Brisk effervescence is produced. **1**
- $Na_2CO_3 + 2HCl \longrightarrow 2 NaCl + H_2O + CO_2$
(CBSE Marking Scheme, 2019) 1

23. In three test tubes A, B and C, three different liquids namely, distilled water, underground water and distilled water in which a pinch of calcium sulphate is dissolved, respectively are taken. Equal amount of soap solution is added to each test tube and the contents are shaken. In which test tube will

the length of the foam (lather) be longest ? Justify your answer. **2**

Ans. • In test tube A **1**
- As distilled water contains no salts.
(CBSE Marking Scheme, 2019) 1

24. A student is observing the temporary mount of a leaf peel under a microscope. Draw labelled diagram of the structure of stomata as seen under the microscope. **2**

OR

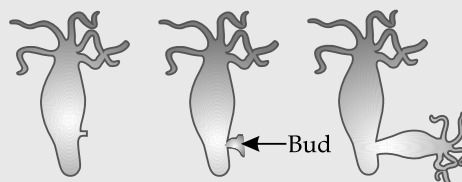**Draw a labelled diagram in proper sequence to show budding in Hydra.**

Ans.
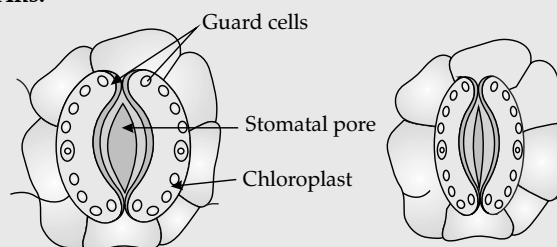
(Any one diagram with any two labellings)
½ × 2
(CBSE Marking Scheme, 2019)

OR

Drawing in proper sequence
Labelling – Bud **1**
(CBSE Marking Scheme, 2019)

25. In the experimental set up to show that "CO$_2$ is given out during respiration", name the substances taken in the small test tube kept in the conical flask. State its functions and the consequence of its use. **2**

Ans. • **Substance taken:** KOH **½**
- **Function:** It absorbs CO_2 produced by the germinating seeds. **½**

Consequence: The water level rises in the test tube dipped in the beaker / partial vacuum is created. **1**
(CBSE Marking Scheme, 2019)

26. While studying the dependence of potential difference (V) across a resistor on the current

(I) passing through it, in order to determine the resistance of the resistor, a student took 5 readings for different values of current and plotted a graph between V and I. He got a straight line graph passing through the origin. What does the straight line signify? Write the method of determining resistance of the resister using this graph. **2**

OR

What would you suggest to a student if while performing an experiment he finds that the pointer needle of the ammeter and voltmeter do not coincide with the zero marks on the scales when circuit is open ? No extra ammeter/ voltmeter is available in the laboratory.

Ans. • Potential difference (V) is directly proportional to current (I) or V ∝ I. **1**
• **Method :** Finding slope of the graph. **1**
(CBSE Marking Scheme, 2019)

Detailed Answer:

The graph between V and I is a straight line and passes the origin, this verifies the Ohm's law.
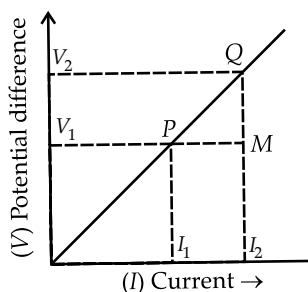
(I) Current →

The slope gives the resistance of the resistor used in the circuit.

$$\text{Slope} = \frac{QM}{MP} = \frac{V_2 - V_1}{I_2 - I_1}$$

or

$$R = \frac{\text{Value of potential difference at a point}}{\text{Value of current at the same point}}$$

OR

• Measure the zero error. **1**
• Value of zero error should be adjusted to the observed values. **1**
(CBSE Marking Scheme, 2019)

27. List four precautions which a student should observe while determining the focal length of a given convex lens by obtaining image of a distant object on a screen. **2**

Ans. Precautions:
(1) Lens should be held in vertical position with its faces parallel to the screen.
(2) Clear and sharpest image should be obtained by adjusting the position of lens.
(3) Three observations should be taken at least.
(4) Base of lens, screen and measuring scale should be in straight line. **(or any other)**
(CBSE Marking Scheme, 2019) ½ × 4=2

Delhi Set II   **Code No. 31/1/2**

Note : Except these, all other questions are from Set I.

SECTION - A

1. Name and define the SI unit of current. **1**

Ans. • Ampere ½
• Flow of 1 coulomb of charge per second / 1 ampere
$$= \frac{1\,\text{coulomb}}{1\,\text{second}}$$
(CBSE Marking Scheme, 2019) ½

2. Write the name of the main constituent of biogas. Also state its percentage. **1**

Ans. • Methane ½
• 75% **(CBSE Marking Scheme, 2019)** ½

SECTION - B

* 3. Write the name, symbol and electronic configuration of an element X whose atomic number is 11. **2**
OR
Can the following groups of elements be classified as Dobereiner's triad:
(a) Na, Si, Cl   **(b) Be, Mg, Ca**
Atomic mass of Be-9; Na-23, Mg-24, Si-28, Cl-35, Ca-40.
Justify your answer in each case.

4. How is O_2 and CO_2 transported in human beings ? **2**

Ans. O_2 is carried by haemoglobin of red blood corpuscles / cells. **1**
CO_2 is carried by plasma of the blood. **1**
(CBSE Marking Scheme, 2019)

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* *Out of Syllabus*

5. Write the structure of eye lens and state the role of ciliary muscles in the human eye. **2**

Ans. Structure : Fibrous, jelly like structure **1**

Role: To change the curvature of eye lens / to change the focal length of eye lens.

(CBSE Marking Scheme, 2019) 1

SECTION - C

6. Identify the acid and base which form sodium hydrogen carbonate. Write chemical equation in support of your answer. State whether this compound is acidic, basic or neutral. Also write its pH value. **3**

Ans. Sodium hydroxide (NaOH) is the base and hydrogen carbonate (H_2CO_3) is the acid which forms sodium hydrogen carbonate ($NaHCO_3$).

$$NaOH + H_2CO_3 \longrightarrow NaHCO_3 + H_2O$$

The compound is basic (weak). Its pH is more than 7.

9. Define the term transpiration. Design an experiment to demonstrate this process. **3**

Ans. Transpiration: Loss of water in vapour form through the surface of leaf / stomata of leaf / aerial parts of the plant. **1**

Experiment setup:
- Take a potted plant and water it.
- Cover the plant / branch with a transparent plastic sheet.
- Place it in bright sunlight for half an hour.
- Moisture in the form of droplets is observed inside the plastic sheet.

(CBSE Marking Scheme, 2019) ½ × 4=2

10. What is feedback mechanism of hormonic regulation. Take the example of insulin to explain this phenomenon. **3**

Ans. Feedback mechanism: Mechanism by which the amount of any chemical increases or decreases resulting in secretion of the related hormone. **1**

Example : when sugar level rises, insulin secretion increases. **1**

When sugar level falls, insulin secretion reduces.

(CBSE Marking Scheme, 2019) 1

13. Why should there be equitable distribution of resources ? List three forces that would be working against an equitable distribution of our resources. **3**

Ans. • Need for equitable distribution of resources :

So that all and not just a handful of rich and powerful people benefit from the development of these resources / all living beings have a birthright to the available resources. **1**

• Forces against equitable distribution of resources :
  (1) Industrialists who work for their own benefit / profit.
  (2) When environmental laws / rules are not implemented properly.
  (3) Mismanagement in the distribution of natural resources.

(Or any other relevant point)
(Any two points) 1 + 1
(CBSE Marking Scheme, 2019)

SECTION - D

17. (a) Write chemical equations for the following reactions: **5**
  (i) Calcium metal reacts with water.
  (ii) Cinnabar is heated in the presence of air.
  (iii) Manganese dioxide is heated with aluminium powder.

(b) What are alloys ? List two properties of alloys.

Ans. (a) (i) $Ca + 2H_2O \longrightarrow Ca(OH)_2 + H_2$ **1**

(ii) $2HgS + 3O_2 \xrightarrow{\Delta} 2HgO + 2SO_2$ **1**
(iii) $3MnO_2 + 4Al \longrightarrow 2Al_2O_3 + 3Mn$ **1**

(b) Alloys are homogeneous mixture of two or more metals or a metal and a non-metal **1**

Properties:
Alloys are stronger / harder / have low melting point / more resistant to corrosion / some are magnetic in nature.
(Any two) ½ + ½

(CBSE Marking Scheme, 2019)

18. An object is placed at a distance of 30 cm from a concave lens of focal length 30 cm. **5**

(i) Use lens formula to determine the distance of the image from the lens.

(ii) List four characteristics of the image (nature position, size, erect/inverted) in this case.

(iii) Draw a labelled diagram to justify your answer of part (ii).

Ans.(i) $u = -30$ cm $\quad f = -30$ cm $\quad v = ?$ ½

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

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

$$\frac{1}{v} = \frac{1}{(-30\,\text{cm})} + \frac{1}{(-30\,\text{cm})}$$
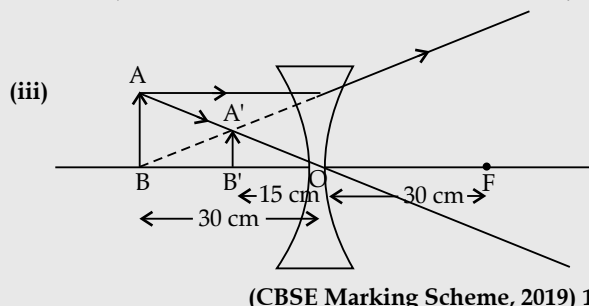
$$= \frac{-2}{30}\,\text{cm}$$

$$v = -15\,\text{cm} \qquad 1$$

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

$$\frac{(-15\,\text{cm})}{(-30\,\text{cm})} = -\frac{1}{2} \qquad ½$$

(ii) Nature — Virtual ½

Position — 15 cm away from the lens, on the same side as the object ½

Size — Diminished ½

Erect / inverted – Erect ½

(iii)

(CBSE Marking Scheme, 2019) 1

Delhi Set III   Code No. 31/1/3

Note: Except these, all other questions are from Set I and II.

SECTION - A

1. If you could use any source of energy for heating your food, which one would you prefer ? State one reason for your choice. 1

Ans. Fuel energy / microwave / hot plate / solar energy

• Easily available

(Or any other source of energy with reason)
(CBSE Marking Scheme, 2019) 1

2. Write the function of voltmeter in an electric circuit. 1

Ans. To measure potential difference across two points.
(CBSE Marking Scheme, 2019) 1

SECTION - B

3. What happens to the image distance in the normal human eye when we decrease the distance of an object, say 10 m to 1 m ? Justify your answer. 2

Ans. • Image distance remains the same. 1

• It is the distance between the eye lens and retina, which remains the same. 1

(CBSE Marking Scheme, 2019)

4. List two different functions performed by pancreas in our body. 2

Ans. (i) Pancreas act as a gland by secreting pancreatic juice which contains enzymes. 1

(ii) Secretes hormones like insulin / glucagon 1
(CBSE Marking Scheme, 2019)

SECTION - C

7. List three advantages each of :
(i) exploiting resources with short term aims, and
(ii) using a long term perspective in managing our natural resources. 3

Ans. Three advantages of exploiting resources with short term aims:

(i) Immediate benefit to few people.

(ii) Progress in science and technology for development in a country.

(iii) Urbanisation and Industrialisation of an area.
½ × 3

Three advantages of using a long term perspective :

(i) Resources will be made available for sustainable development.

(ii) Provides valuable contribution to the socio-economic development.

(iii) Quality of environment will be conserved. ½ × 3
(CBSE Marking Scheme, 2019)

9. Nervous and hormonal systems together perform the function of control and coordination in human beings. Justify this statement with the help of an example. 3

Ans. For nervous and hormonal systems to control and coordinate in human beings, hypothalamus plays an important role in receiving the neural / nerve signals from brain and release hormones. 1

Ex – In situation of iodine deficiency, hypothalamus releases hormones to stimulate pituitary gland, it further sends stimulating hormone to thyroid gland to secrete thyroxine that regulates carbohydrate metabolism. 1 + 1
(CBSE Marking Scheme, 2019)

11. What is photosynthesis ? Explain its mechanism. 3

Ans. A process in which green plants takes carbon dioxide and water and convert them into carbohydrates / food in the presence of sunlight and chlorophyll. **1**

Mechanism:

(i) Absorption of light energy by chlorophyll.

(ii) Conversion of light energy to chemical energy.

(iii) Splitting of water molecules into hydrogen and oxygen.

(iv) Reduction of carbon dioxide to carbohydrate.

(CBSE Marking Scheme, 2019) ½ × 4

15. Explain the following:

(a) Sodium chloride is an ionic compound which does not conduct electricity in solid state, whereas it does conduct electricity in molten state as well as in its aqueous solution.

(b) Reactivity of aluminium decrease if it is dipped in nitric acid.

(c) Metals like calcium and magnesium are never found in their free state in nature. 3

Ans. (a) Sodium chloride do not conduct electricity in solid state because ions are fixed in position and cannot move but in molten state, due to heat the electrostatic forces of attraction between the oppositely charged ions are overcomed. So ions move freely and conduct electricity. In aqueous solutions ions are free and conduct electricity.

½ + ½

(b) Due to the formation of a coating of aluminium oxide / Al_2O_3. **1**

(c) Reactive metals like calcium and magnesium react easily with different elements and occur in the form of ores.

(CBSE Marking Scheme, 2019) 1

SECTION - D

21. Write the main difference between an acid and a base. With the help of suitable examples explain the term neutralization and the formation of :
(i) acidic,
(ii) basic and
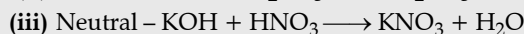**(iii) neutral salts. 5**

Ans. •

Acid	Base
1. An acid produces H^+ ions in aqueous solution.	A base produces OH^- ions in aqueous solution.
2. Acids are sour in taste.	Bases are bitter in taste.
3. Acids change the colour of blue litmus to red.	Bases change the colour of red litmus to blue.

1 (Any one)

• Neutralization – A reaction of an acid with a base to produce salt and water. **1**

(i) Acidic – $NH_4OH + HCl \longrightarrow NH_4Cl + H_2O$

1

(ii) Basic – $2NaOH + H_2CO_3 \longrightarrow Na_2CO_3 + 2H_2O$ **1**

(iii) Neutral – $KOH + HNO_3 \longrightarrow KNO_3 + H_2O$

(or any other example) 1

(CBSE Marking Scheme, 2019)

Outside Delhi Set I   Code No. 31/2/1

SECTION - A

1. Name two industries based on forest produce. 1

Ans. Timber / Bidi / Paper / Medicine.

(Any two) ½ + ½
(CBSE Marking Scheme, 2019)

Detailed Answer:

Paper industry and sports equipment industry.

2. Why are the heating elements of electric toasters and electric irons made of an alloy rather than a pure metal ? 1
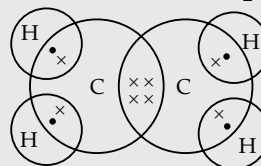
Ans. Due to high resistivity of alloys rather than its constituting metals.

(CBSE Marking Scheme, 2019) 1

SECTION - B

3. Write the molecular formula of ethene and draw its electron dot structure. 2

Ans. Molecular formula - C_2H_4. **1**

(CBSE Marking Scheme, 2019) 1

4. Give reasons:

(a) Platinum, gold and silver are used to make jewellery.

(b) Metals like sodium and potassium are stored under oil. 2

OR

Silver articles become black when kept in open for some time, whereas copper vessels lose their shiny brown surfaces and gain a green coat when kept in open. Name the substances present in air with which these metals react and write the name of the products formed.

Ans. (a) Lustre, ductile, malleable, least reactive.

(Any two) ½ + ½

(b) Na & K are highly reactive (in air & moisture).

(CBSE Marking Scheme, 2019) 1

OR

		Products
Silver	Sulphur in air	Silver sulphide ½ + ½
Copper	Moisture & Carbon dioxide	Copper Carbonate ½ × 4=2

(CBSE Marking Scheme, 2019)

5. The absolute refractive index of Ruby is 1.7. Find the speed of light in Ruby. The speed of light in vacuum is 3×10^8 m/s. **2**

Ans. $\mu = \dfrac{\text{Speed of light in vacuum}}{\text{Speed of light in Ruby}} = \dfrac{c}{v}$ ½

$v = \dfrac{c}{\mu}$ ½

Where, c = velocity of light

μ = refractive index

$v = \dfrac{3 \times 10^8}{1.7} = 1.76 \times 10^8$ m/s

½ × 4=2

(CBSE Marking Scheme, 2019)

SECTION - C

6. On heating blue coloured powder of copper (II) nitrate in a boiling tube, black copper oxide, O_2 and a brown gas X is formed.

(a) Identify the type of reaction and the gas X.

(b) Write balanced chemical equation of the reaction.

(c) Write the pH range of aqueous solution of the gas X. **3**

Ans. (a) Decomposition / Thermal decomposition,

½

The gas X is NO_2 or (nitrogen dioxide)   ½

(b) $2Cu\,(NO_3)_2 \xrightarrow{\text{Heat}} 2CuO + 4NO_2 + O_2$ **1**

(c) Range less than 7 (or 0 – 6.9 pH)

Note : For (b) ½ mark for equation and ½ mark for balancing the equation   **1**

(CBSE Marking Scheme, 2019)

7. (a) While diluting an acid, why is it recommended that the acid should be added to water and not water to the acid ?

(b) Dry hydrogen chloride gas does not change the colour of dry litmus paper. Why ?   **3**

OR

How is sodium hydroxide manufactured in industries ? Name the process. In this process a gas X is formed as by-product. This gas reacts with lime water to give a compound Y, which is used as a bleaching agent in the chemical industry. Identify X and Y and write the chemical equation of the reactions involved.

Ans. (a) The process of diluting an acid is highly exothermic, and on the addition of acid to the water the excess heat is absorbed by water.

1 + 1

(b) Because HCl does not form H^+/H_3O^+ ions in dry condition.   **1**

(CBSE Marking Scheme, 2019)

OR

• When electricity is passed through an aqueous solution of sodium chloride (brine).

½

• Chlor – alkali process   ½
• X = Cl_2 ½
• Y = $CaOCl_2$ ½
• $2NaCl_{(aq)} + 2H_2O_{(l)} \longrightarrow 2NaOH_{(aq)} + Cl_{2(g)} + H_{2(g)}$ ½
• $Ca(OH)_2 + Cl_2 \longrightarrow CaOCl_2 + H_2O$ ½×**6=3**

(CBSE Marking Scheme, 2019)

8. What are amphoteric oxides? Give an example. Write balanced chemical equations to justify your answer.   **3**

Ans. • Metal oxides showing both acidic and basic nature.   ½
• **Example:** Al_2O_3 / ZnO

(or any other) ½
• $Al_2O_3 + 6HCl \longrightarrow 2AlCl_3 + 3H_2O$ **1**
  $Al_2O_3 + 2NaOH \longrightarrow 2NaAlO_2 + H_2O$

(CBSE Marking Scheme, 2019) 1

9. What is a homologous series of carbon compounds ? Give an example and list its three characteristics.   **3**

Ans. A group of carbon compound having same general formula and same functional group is called homologous series.
For example: Alkane:
CH_4 – methane,
C_2H_6 – ethane,
C_3H_8 – propane.   ½

• Characteristics:
  (i)   They have same general formula.

(ii) They have same functional group.

(iii) The difference in the molecular mass of two successive member is 14μ.

(iv) The difference in the molecular formula of two successive members is of CH_2 unit.

(v) They have similar chemical properties.

(Any three points) ½ × 3
(CBSE Marking Scheme, 2019)

10. List in tabular form three distinguishing features between autotrophic nutrition and heterotrophic nutrition. **3**

Ans.

	Autotrophic Nutrition	Heterotrophic Nutrition
1.	They can prepare their own food.	They cannot prepare their own food.
2.	They require raw materials like CO_2, H_2O in the presence of sunlight and chlorophyll to prepare their food.	They depend on other plants and animals for their food.
3.	They store the food in the form of starch.	They store the food in the form of glycogen.

(Any three point)
(CBSE Marking Scheme, 2019) 1 × 3 = 3

11. What is transpiration ? List its two functions. **3**

OR

(a) What is translocation ? Why is it essential for plants ?

(b) Where do the substances in plants reach as a result of translocation ?

Ans. The loss of water in the form of vapour from the aerial parts/leaves/stems is known as transpiration. **1**

• **Functions :**

(i) It helps in the absorption and upward movement of water.

(ii) Movement of dissolved minerals from root to leaves.

(iii) It helps in the temperature regulation or cooling of the plant.

(Any two points) 1 + 1
(CBSE Marking Scheme, 2019)

OR

(a) The transport of soluble products of photosynthesis (food or glucose) from one part to the other parts of the plant.
To provide food to all parts of the plant.

(b) Root, fruits, seeds and other growing organs/parts of the plant. **(Any two)**
(CBSE Marking Scheme, 2019) 2

12. What is carpel ? Write the function of its various parts. **3**

Ans. Female reproductive part of the plant. **1**

Stigma – receive pollen grains
Style – passage for the growth of pollen tube
Ovary – Site for fertilization **1 + 1**

If any two parts with function attempted award 1½ marks only
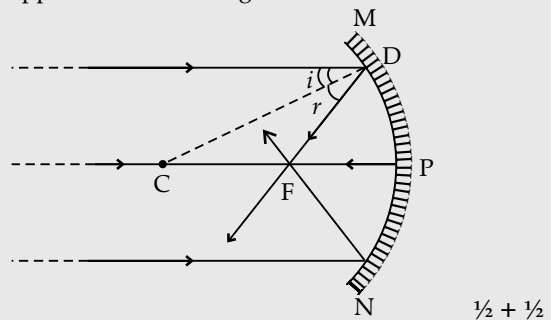
(CBSE Marking Scheme, 2019)

13. A student holding a mirror in his hand, directed the reflecting surface of the mirror towards the Sun. He then directed the reflected light on to a sheet of paper held close to the mirror. **3**

(a) What should he do to burn the paper ?

(b) Which type of mirror does he have ?

(c) Will he be able to determine the approximate value of focal length of this mirror form this activity ? Give reason and draw ray diagram to justify your answer in this case.

OR

A 10 cm tall object is placed perpendicular to the principal axis of a convex lens of focal length 12 cm. The distance of the object from the lens is 18 cm. Find the nature, position and size of the image formed.

Ans. (a) Move the mirror/paper to focus the rays at one point. **½**

(b) Concave mirror. **½**

(c) Yes, distance between mirror and focal point gives approximate focal length. **½ + ½**

½ + ½
(CBSE Marking Scheme, 2019)

OR

$$\frac{1}{v} - \frac{1}{u} = \frac{1}{f} \quad \therefore \quad \frac{1}{v} = \frac{1}{f} + \frac{1}{u}$$ ½

$$\frac{1}{v} = \frac{1}{12} + \frac{1}{(-18)}$$ **1**

$$\therefore \qquad v = 36 \text{ cm}$$ ½

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

$$\Rightarrow \qquad \therefore m = \frac{36}{-18} = \frac{h'}{10}$$ ½

$$\Rightarrow \qquad h' = -20 \text{ cm (size of the image)} \qquad \tfrac{1}{2}$$
Nature of image – Real and inverted
(CBSE Marking Scheme, 2019)

14. **What are solar cells ? Explain the structure of solar panel. List two principal advantages associates with solar cells.** **3**

Ans. A device that converts solar energy directly into electrical energy. **1**

A large no. of solar cells are combined in an arrangement called Solar Cell Panel. **1**

Principal Advantages:

(i) They have no moving parts.

(ii) Require little maintenance & work quite satisfactorily without the use of any focusing device.

(iii) These cells can be set up in remote & inaccessible areas where laying of a power transmission may be expensive. **(Any two) ½ + ½**
(CBSE Marking Scheme, 2019)

15. **Write the essential function performed by ozone at the higher levels of the Earth's atmosphere ? How is it produced ? Name the synthetic chemicals mainly responsible for the drop of amount of ozone in the atmosphere. How can the use of these chemicals be reduced ?** **3**

Ans. It shields the surface of the earth from the UV radiation from the sun. **1**

$$O_2 \xrightarrow{\text{UV}} O + O$$
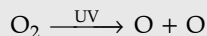
$$O_2 + O \longrightarrow O_3 \text{ \{or description of this process in words\}} \qquad \textbf{1}$$

Chloro Fluoro Carbons (CFC's) ½

Reduce the use of CFC's by (a) minimizing the leakage through air conditioners and refrigerators / finding substitute chemicals that are ozone friendly. ½
(CBSE Marking Scheme, 2019)

SECTION - D

* **16. (a) List any three observations which posed a challenge to Mendeleev's Periodic Law.**

(b) How does the metallic character of elements vary on moving from

(i) left to right in a period,

(ii) from top to bottom in a period of the Modern Periodic Table ?

Given reason for your answer. **5**

OR

The electrons in the atoms of four elements A, B, C and D are distributed in three shells having 1, 3, 5 and 7 electrons respectively in their outermost shells. Write the group numbers in which these elements are placed in the Modern Periodic Table.

* Out of Syllabus

Write the electronic configuration of the atoms of B and D and the molecular formula of the compound formed when B and D combine.

OR

	A	B	C	D
Group no.	1	3	5	7
	1st	13th	15th	17th

½ × 4

- B = 2, 8, 3 D = 2 , 8 , 7 **1 + 1**
- BD₃ **1**
(CBSE Marking Scheme, 2019)

Detailed Answer:

Elements	Valence electrons	Period	Group
A	1	3	1
B	3	3	13
C	5	3	15
D	7	3	17

½ × 4

Electronic configuration of B : 2, 8, 3
Electronic configuration of D : 2, 8, 7

Element : B D **1 + 1**

3 1

Valency:
So, the molecular formula will be BD₃. **1**

17. (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. **5**

OR

What is hydrotropism ? Design an experiment to demonstrate this phenomenon.

Ans. (a) • Iodine is essential for functioning of thyroid / formation of thyroxine hormone **1**
- Disease is Goitre **1**
- Swollen neck **1**

(b) Impulse 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.

(Award marks if attempted as a flow chart also)
(CBSE Marking Scheme, 2019) 2

OR

The movement/response of part of plant (root) towards water **1**

Experiment:
(i) Soak the seeds in water overnight. ½
(ii) Place moist cotton in a perforated petridish. ½
(iii) Put the soaked seeds in the petridish & place it on a beaker. 1
(iv) Roots pass through pores and grow downwards. 1
(v) After sometime roots will bend towards base of petridish having moisture. 1
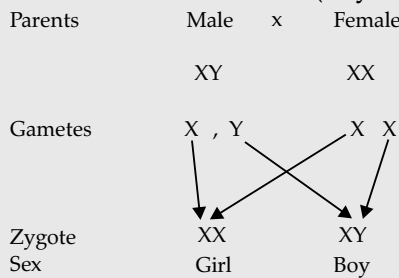**(CBSE Marking Scheme, 2019)**

18. **(a)** What are homologous structures ? Give an example.

(b) "The sex of a newborn child is a matter of chance and none of the parents may be considered responsible for it." Justify this statement with the help of a flow chart showing sex-determination in human beings. **5**

Ans. (a) The organs having similar origin / structures but performing different functions. **1**

Example: limbs of frog, limbs of lizard, bird, human **(Any two)** ½ + ½

| Parents	Male	x	Female
	XY		XX
Gametes	X , Y		X X
Zygote	XX		XY
Sex	Girl		Boy

Hence, sex determination is purely a matter of chance. **(CBSE Marking Scheme, 2019) 3**

19. When do we consider a person to be myopic or hypermetropic ? List two causes of hypermetropia. Explain using ray diagrams how the defect associated with hypermetropic eye can be corrected. **5**

Ans. Myopia: Difficult to see the objects placed far away / **Hypermetropia:** Difficult to see very close or nearby objects. **1**

Causes of hypermetropia : (i) The focal length of the eye lens is too long (ii) eye ball has become too small ½ + ½
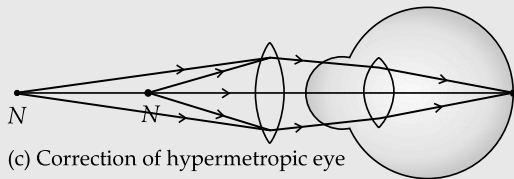
(c) Correction of hypermetropic eye

Note: Diagram with brief description -03; only correct diagram with labelling -2 or only explanation 01. **3**
(CBSE Marking Scheme, 2019)

20. **(a)** How will you infer with the help of an experiment that the same current flows through every part of a circuit containing three resistors in series connected to a battery ?

(b) Consider the given circuit and find the current flowing in the circuit and potential difference across the 15Ω resistor when the circuit is closed. 5

5Ω   10Ω   15Ω

30V
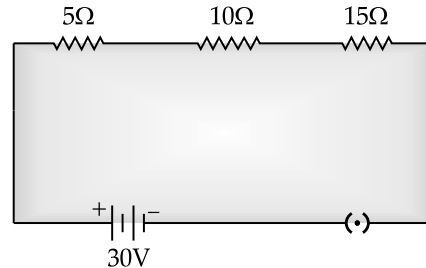
OR

(a) Three resistors R_1, R_2 and R_3 are connected in parallel and the combination is connected to a battery, ammeter, voltmeter and key. Draw suitable circuit diagram and obtain an expression for the equivalent resistance of the combination of the resistors.

(b) Calculate the equivalent resistance of the following network:

20Ω
A —10Ω—   —B
20Ω
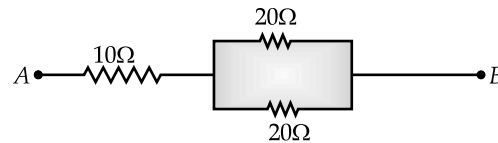
Ans. (a) (i) J in the three resistors of different values in series.
(ii) Connect them with battery, an ammeter and plug key.
(iii) Plug the key and note the ammeter reading.
(iv) Change the position of ammeter to anywhere in between the resistors and note the ammeter reading each time.
(v) The ammeter reading will remain same everytime. Therefore when resistors are connected in series same current flows through all resistors, when it is connected to a battery.
Note: If explained with the help of diagram give full credit. ½ × 5

(b) Total resistance of the circuit = **1**
$R = R_1 + R_2 + R_3 = 5 + 10 + 15 = 30$ ohm
Potential difference across the circuit / By ohm's law
$V = IR$ or $I = \dfrac{V}{R} = \dfrac{30V}{30 \text{ ohm}} = 1A$ **1**

Potential difference across 15 ohm Resistor = 1A × 15 ohm = 15 volt ½
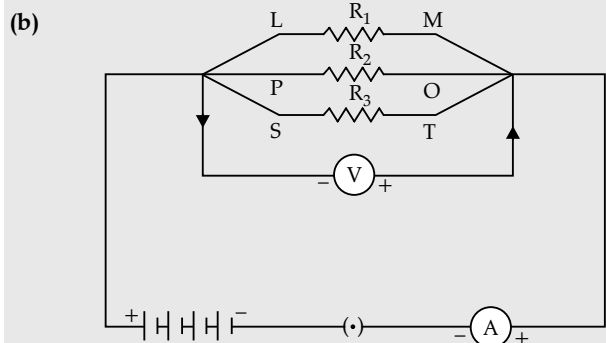**(CBSE Marking Scheme, 2019)**

OR

(a) (i) Total current $I = I_1 + I_2 + I_3$ R_3.
Let R_p be the equivalent resistance of $R_1, R_2,$
Then the total current $I = \dfrac{V}{R_p}$ **1**

(ii) On applying ohm's law for each R_1, R_2, R_3
$$R_p = 10 \text{ ohms}$$
$$I_1 = \frac{V}{R_1}, I_2 = \frac{V}{R_2}, I_3 = \frac{V}{R_3} \qquad ½$$

$$\therefore \qquad I = V\left(\frac{1}{R_1} + \frac{1}{R_2} + \frac{1}{R_3}\right) = \frac{V}{R_p} \qquad ½$$

$$\therefore \qquad \frac{1}{R_p} = \frac{1}{R_1} + \frac{1}{R_2} + \frac{1}{R_3} \qquad \textbf{1}$$

(b)

$$\frac{1}{R_p} = \frac{1}{20} + \frac{1}{20} = \frac{2}{20} = \frac{1}{10} \qquad \textbf{1}$$

$$R_p = 10 \text{ ohms}$$
Equivalent resistance of the network $= R_{eq} = R_1 + R_p = 10 + 10 = 20$ ohm. **1**
(CBSE Marking Scheme, 2019)

21. **Draw the pattern of magnetic field lines produced around a current carrying straight conductor passing perpendicularly through a horizontal cardboard. State and apply right-hand thumb rule to mark the direction of the field lines. How will the strength of the magnetic field change when the point where magnetic field is to be determined is moved away from the straight conductor ? Give reason to justify your answer.** **5**
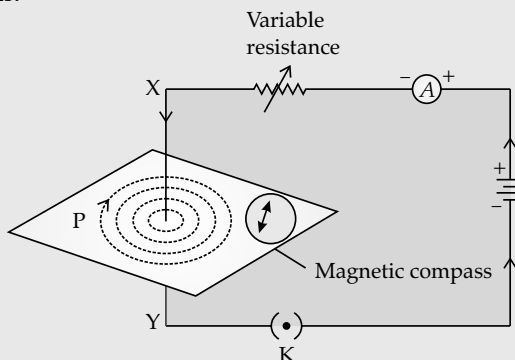
Ans.

Diagram 1½ and direction ½

Statement of right hand thumb rule. **1 + 1**
The magnetic field strength decreases with increase of distance from the current carrying conductor. **1**
Reason: There is inverse relation between field strength and distance from current carrying conductor. **1**
Note : Direction of magnetic field should be in accordance with direction of current. **1**
(CBSE Marking Scheme, 2019)

SECTION - E

22. **A teacher provided acetic acid, water, lemon juice, aqueous solution of sodium hydrogen carbonate and sodium hydroxide to students in the school laboratory to determine the pH values of these substances using pH papers. One of the students reported the pH values of the given substances as 3, 12, 4, 8 and 14 respectively. Which one of these values is not correct ? Write its correct value stating the reason.** **2**

OR

What would a student report nearly after 30 minutes of placing duly cleaned strips of aluminium, copper, iron and zinc in freshly prepared iron sulphate taken in four beakers ?
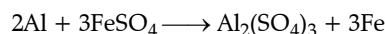
Ans. • The pH value of water given is incorrect.
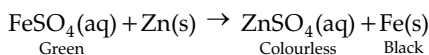• Its correct value is 7 it is neutral in nature.
1 + 1=2
(CBSE Marking Scheme, 2019)

OR

In the test tube containing Al, blue colored aluminium sulphate is formed. This is a displacement reaction.
$$2Al + 3FeSO_4 \longrightarrow Al_2(SO_4)_3 + 3Fe$$
In the text tube containing Zn, grayish black precipitate is deposited. This is a displacement reaction.
$$\underset{\text{Green}}{FeSO_4(aq)} + Zn(s) \rightarrow \underset{\text{Colourless}}{ZnSO_4(aq)} + \underset{\text{Black}}{Fe(s)}$$
In the test tube containing Fe, no reaction takes place.
In the test tube containing Cu, no reaction takes place as Cu is less reactive than iron.

23. **What is observed when a pinch of sodium hydrogen carbonate is added to 2mL of acetic acid taken in a test tube? Write chemical equation for the reaction involved in this case.** **2**

Ans. • Brisk effervescence of CO_2 evolved. **1**
• $CH_3COOH + NaHCO_3 \rightarrow CH_3COONa + CO_2 + H_2O$ **1+1=2**
(CBSE Marking Scheme, 2019)

24. **List in proper sequence four steps of obtaining germinating dicot seeds.** **2**

OR
After examining a prepared slide under the high power of a compound microscope, a student concludes that the given slide shows the various stages of binary fission in a unicellular organism. Write two observations on the basis of which such a conclusion may be drawn.

Ans.(i) Soaking of seeds   ½
  (ii) Emergence of radicle   ½
  (iii) Splitting of cotyledons   ½
  (iv) Emergence of plumule   ½
                          (CBSE Marking Scheme, 2019)

OR

  (i) Elongation of nucleus   **1**
  (ii) Constriction appears due to the division of the cytoplasm
                          (CBSE Marking Scheme, 2019) 1

25. List four precautions which a student should observe while preparing a temporary mount of a leaf peel to show stomata in his school laboratory.   **2**

Ans. (i) Size of the leaf peel should be very small.
  (ii) Put peel immediately in the drop of water.
  (iii) Place cover slip carefully to avoid the air bubbles.
  (iv) It should not be over stained.
  (v) No fold in the peel.   **(Any four) ½ × 4**
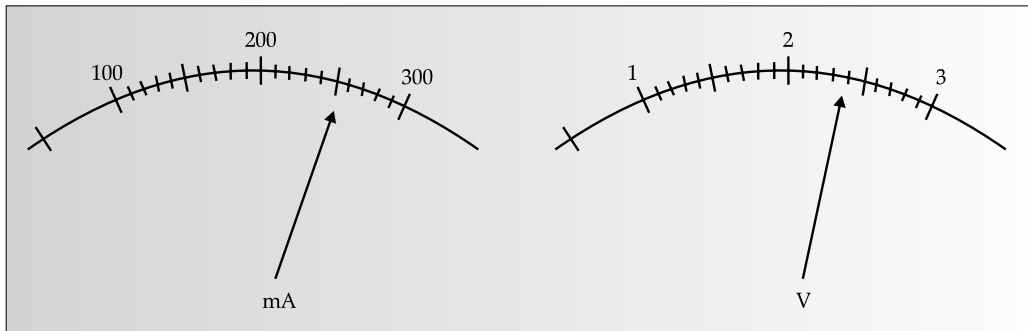   **(CBSE Marking Scheme, 2019)**

26. Draw the path of a ray of light when it enters one of the faces of a glass slab at an angle of nearly 45°. Label on it (i) angle of refraction, (ii) angle of emergence and (iii) lateral displacement.   **2**
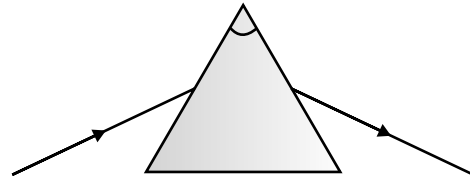   **OR**
A student traces the path of a ray of light through a glass prism as shown in the diagram, but leaves it incomplete and unlabelled. Redraw and complete the diagram. Also label on it ∠i, ∠e, ∠r and ∠D.

Ans.

Labelling
• Angle of refraction (r_1)
• Angle of emergence (e)
• Lateral displacement (ML)   **½ × 3**
                          (CBSE Marking Scheme, 2019)

OR

Labelling of ∠i + ∠e + ∠r & ∠D
                          (CBSE Marking Scheme, 2019) ½ × 4

27. The current flowing through a resistor connected in a circuit and the potential difference developed across its ends are as shown in the diagram by milliammeter and voltmeter readings respectively: **2**
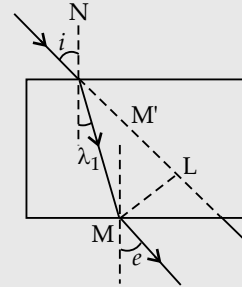 **(a)**   **What are the least counts of these meters ?**
  (b) What is the resistance of the resistor ?

Ans. (a) ∠ least count of ammeter = 10 mA   ½ + ½
        ∠ least count of Voltmeter = 0.1 V   ½ + ½
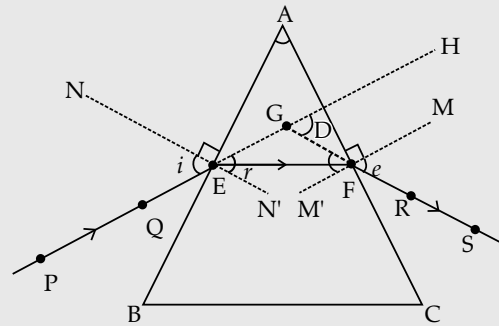 **(b)** $\dfrac{2.4}{0.25}$ = 9.6 ohm (250 mA = 0.25 A)   **(CBSE Marking Scheme, 2019)**

Detailed Answer :

(a)

$$\text{Least count of milliammeter} = \frac{100}{10} = 10\text{mA}$$

$$\text{Least count of voltmeter} = \frac{1}{10} = 0.1 \text{ V}$$

(b)

$$\text{Current, } I = 250 \text{ mA} = 250 \times 10^{-3}A$$

$$\text{Potential difference, } V = 2.4 \text{ V}$$

$$\text{Resistance, } R = \frac{V}{I} = \frac{2.4}{250 \times 10^{-3}} = 9.6\Omega$$

Outside Delhi Set II   Code No. 31/2/2

Note : Except these, all other questions are from Set I.

SECTION - A

1. Write two advantages associated with water harvesting at the community level. 1

Ans. (i) Recharged the ground water level   ½
(ii) Brought rivers back to life
(CBSE Marking Scheme, 2019) ½

2. Should the resistance of a voltmeter be low or high ? Give reason. 1

Ans. High, In parallel connection, less current passes through high resistance.
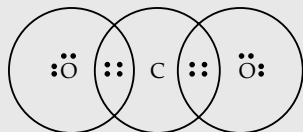**(CBSE Marking Scheme, 2019)** ½ + ½

SECTION - B

3. Draw electron dot structure of carbon dioxide and write the nature of bonding between carbon and oxygen in its molecule. 2

OR

List two properties of carbon which lead to the huge number of carbon compounds we see around us, giving reason for each.

Ans. Double covalent bond   1

1
(CBSE Marking Scheme, 2019)

OR

(i) Catenation / ability to form long chains   ½
Reason: very strong carbon – carbon bond   ½
(ii) Tetravalency / valency of four   ½
Reason: All the four valencies of carbon atom are occupied with other elements.   ½
(CBSE Marking Scheme, 2019)

4. Give reason:
(a) Carbonate and sulphide ores are usually converted into oxides during the process of extraction.
(b) Aluminium is a highly reactive metal; still it is widely used in making cooking utensils. 2

Ans. (a) It is easier to obtain a metal from its oxide as compared to sulphide and carbonate ore.   1
(b) Aluminium forms a thicker protective oxide layer / anodizing.
(CBSE Marking Scheme, 2019) 1

5. The power of a lens is +5 diopters. What is the nature and focal length of this lens? At what distance from this lens should an object be placed so as to get its inverted image of the same size ? 2

Ans.

$$P = +5D$$

$$f = \frac{1}{P} = \frac{100}{5} = 20 \text{ cm}$$ 1

Nature of lens = convex (converging)   ½
Distance is 40 cm (at C)
(CBSE Marking Scheme, 2019) ½

SECTION - C

6. List two types of the transport system in human beings and write the functions of any one of these. 3

Ans. (i) Blood circulatory system   ½
(ii) Lymphatic system / lymph or tissue fluid   ½
Functions of blood circulatory system :
(i) Transport of oxygen
(ii) Transport of digested food
(iii) Transport of carbon dioxide
(iv) Transport of nitrogenous waste
(v) Transport of salts
Functions of lymphatic system:
(i) Carries digested and absorbed fat
(ii) Drains extra fluid from tissue   1 × 2
(extra cellular space) back into the blood
Note : Two functions of any one of the transport system to be given.
(CBSE Marking Scheme, 2019)

7. Distinguish between pollination and fertilisation. Mention the site and the product of fertilisation in a flower. 3

Ans. Pollination: Transfer of pollen grains from stamen/ anther to stigma. **1**

Fertilization: Fusion of male & female gamete (or germ cells) **1**

Site of fertilisation: Ovary/ Ovule ½

Product; Zygote.

(CBSE Marking Scheme, 2019) ½

10. List three environmental consequences of using fossil fuels. Suggest three steps to minimise the pollution caused by various energy sources. 3

Ans. Consequences:
(i) Cause air pollution
(ii) The acidic oxides lead to acid rain
(iii) High concentration of green house gas (CO_2) and its effect
(iv) Global Warming **(any 3 points) ½ × 3**

Steps to minimize the pollution:
(i) Use of alternate source of energy
(ii) Use of various devices to reduce emission of harmful gases.
(iii) By increasing efficiency of combustion process

(or any other) ½ × 3
(CBSE Marking Scheme, 2019)

14. Which compounds are called (i) alkanes, (ii) alkenes and (iii) alkynes ? C_4H_{10} belongs to which of these ? Draw two structural isomers of this compound. 3

Ans. ● Alkane
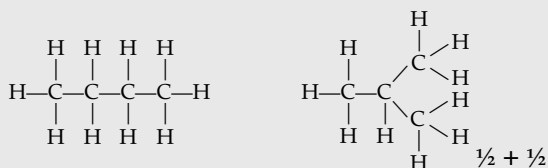
Saturated Hydrocarbon with C–C Single Bond

● Alkene

Unsaturated Hydrocarbon with double bond in C=C

● Alkyne

Unsaturated Hydrocarbon with triple bond in $C \equiv C$ **(or any other) ½ × 3**

● Alkane ½

2 structural isomers

½ + ½

(CBSE Marking Scheme, 2019)

SECTION - D

16. (a) What are dominant and recessive traits ?

(b) "Is it possible that a trait is inherited but may not be expressed in the next generation ?" Give a suitable example to justify this statement. 5

Ans. (a) The trait which expresses itself in F_1 (first) generation after crossing contrasting (opposite) traits is known as dominant character (trait). **1**

Recessive Trait: The trait which is not expressed itself in F_1 (first) generation after crossing contrasting (opposite) trait. **1**

(b) Yes **1**

2
(Or can be explained in words also)
(CBSE Marking Scheme, 2019)

20. (a) What is scattering of light ? Explain how the colour of the scattered light depends on the size of the scattering particles.

(b) Explain the reddish appearance of the Sun at sunrise or sunset. Why does it not appear red at noon ? 5

Ans. (a) Scattering: Direction of ray of light changes when it collides with particles of comparable size. 1

– Fine particle scatter shorter wavelengths like blue light.

– Particles of larger size scatter longer wavelengths like red light.

– If particle size is large enough scattered light may appear white. **½ × 3**

(b) • During sunrise and sunset, sun is near horizon. Sunlight travels longer distance. Most of blue light scatters away by particles. Light of longer wavelength reaches our eye so sun appears reddish.

• At noon, sun is directly overhead so sunlight travels lesser distance. Less amount of blue light is scattered giving white appearance to sun. **½ × 3**

Or can be explained with the help of a diagram given below:
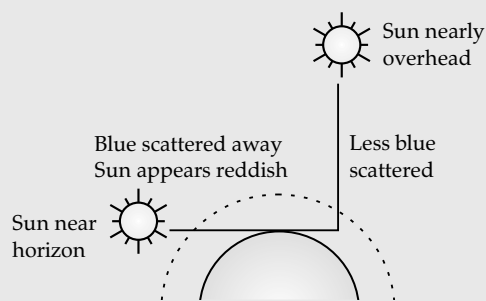
1
(One mark with correct labeling)
(CBSE Marking Scheme, 2019)

Outside Delhi Set III   **Code No. 31/2/3**

Note : Except these, all other questions are from Set I and II

SECTION - A

1. What does the cord of an electric oven not glow while its heating element does ?   **1**

Ans. Cord is made up of copper wire whereas heating element is made up of alloy.

(CBSE Marking Scheme, 2019) 1

2. Although coal and petroleum are produced by the degradation of biomass, yet we need to conserve these resources. Why ?   **1**

Ans. They are non renewable / their formation takes millions of years / exhausted in the future. (any one point)

(CBSE Marking Scheme, 2019) 1

SECTION - B

3. What is atmospheric refraction ? List two phenomena which can be explained on the basis of atmospheric refraction.   **2**

Ans. Refraction of light due to variation in optical density of earth.   **1**
Two phenomenon: (i) Twinkling of stars (ii) Advance sunrise & delayed sunset.   **½ × 2**
(CBSE Marking Scheme, 2019)

4. Name a metal of medium reactivity and write three main steps in the extraction of this metal from its sulphide ore.   **2**

Ans. (i) Iron / Zinc / Lead (any one)   ½
(ii) Concentration of ore / Enrichment of ore   ½
↓
(iii) Roasting / conversion of sulphide into oxide on heating in air   ½
↓
(iv) Reduction of metallic oxide to metal   ½
(CBSE Marking Scheme, 2019)

5. List two chemical properties on the basis of which ethanol and ethanoic acid may be differentiated and explain how.   **2**

OR

Unsaturated hydrocarbons contain multiple bonds between two carbon atoms and these compounds show addition reactions. Out of saturated and unsaturated carbon compounds, which compounds are more reactive? Write a test to distinguish ethane from ethene.

Ans. (i) Ethanoic acid reacts with NaOH to give sodium salt and water but C_2H_5OH does not show this reaction.   **1**

(ii) Ethanoic acid reacts with $NaHCO_3$ (Sodium Bicarbonate) or Na_2CO_3 (Sodium Carbonate) and given sodium salt of ethanoic acid, water and carbon dioxide.   **1**

(CBSE Marking Scheme, 2019)

OR

Unsaturated compounds are more reactive.   **1**
Test : Baeyer's reagent test / Bromine water test given by ethene not by ethane / Ethane gives clear flame while ethene gives a yellow flame with lots of black smoke.   **(any one test) 1**
(CBSE Marking Scheme, 2019)

SECTION - C

6. What happens to a beam of white light when it gets refracted through a glass prism ? Which colour deviates the most and the least after refraction through a prism ? What is likely to happen if a second identical prism is placed in an inverted position with respect to the first prism? Justify your answer.   **3**

OR

A student needs spectacles of power – 0.5D for the correction of his vision.
(i) Name the defect in vision the student is suffering from.
(ii) Find the nature and focal length of the corrective lens.
(iii) List two causes of this defect.

Ans. The white light splits into seven colours when it gets refracted through the glass prism (VIBGYOR)
   1
The colour deviates most – Violet   ½
The colour deviates least – Red   ½
Colours disappear and again white light obtained.
(CBSE Marking Scheme, 2019) 1

Detailed Answer:
When a beam of white light gets refracted through a glass prism, it refracts through different angles causing a splitting of white light into its seven constituent colours (VIBGYOR). This gives rise to the formation of the colour spectrum.
Violet colour deviates the most and red colour deviates the least after refraction through a prism. When a second identical prism is placed in an inverted position with respect to first prism, a beam of white light emerges from the other side of the second prism. The second prism recombines all the seven colours to give a beam of white light.

OR

(i) Myopia	**1**
(ii) Concave / diverging lens and focal	½
Length = 200 cm	½

(iii) (a) excessive curvature of the eye lens		½
(b) elongation of eye ball		½
	(CBSE Marking Scheme, 2019)	

7. 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 ? 3

Ans. Chain of organisms formed as a result of eating or being eaten by organisms is called food chain / A series of organisms feeding on one another, is called food chain. **1**

Grass	→	Insect (grasshopper)	→	Frog	→	Snake	
(Producer)		(Herbivore)		(Carnivore)		(Top Carnivore)	**1**

(Any other example of food chain)

- Tertiary trophic level / snake ½
- Biological magnification / Biomagnification ½

(CBSE Marking Scheme, 2019)

9. During the reaction of some metals with dilute hydrochloric acid, the following observations were made by a change. 3

(a) Silver does not show any change.

(b) Some bubbles of a gas are seen when lead is reacted with the acid.

(c) The reaction of sodium is found to be highly explosive.

(d) The temperature of the reaction mixture rises when aluminium is added to the acid.

Explain these observations giving appropriate reason.

Ans. (a) Silver is placed below Hydrogen in reactivity series / among least reactive metal / Silver does not react with dil. Hydrochloric acid. ½

(b) Rate of reaction is slow / bubbles of Hydrogen gas are formed / lead lies above hydrogen in reactivity series. **1**

(c) Sodium is highly reactive / reaction is highly exothermic, evolving Hydrogen gas, which catches fire. **1**

(d) Reaction is exothermic ½

(CBSE Marking Scheme, 2019)

10. Given below are the steps for the extraction of copper from its ore. Write the chemical equation of the reactions involved in each case. 3

(i) Roasting of copper (I) sulphide

(ii) Reduction of copper (I) oxide from copper (I) sulphide

(iii) Electrolytic refining

Ans. (i) $2\,Cu_2S + 3O_2 \xrightarrow{\text{Heat}} 2\,Cu_2O + 2SO_2$ **1**

(ii) $2Cu_2O + Cu_2S \xrightarrow{\text{Heat}} 6\,Cu + SO_2$ **1**

(iii) At anode : $\to Cu \to Cu^{2+} + 2e-$ ½

At Cathode $\to Cu^{2+} + 2e^- \to Cu$ ½

(CBSE Marking Scheme, 2019)

15. (a) Budding, fragmentation and regeneration, all are considered as asexual mode of reproduction. Why ?

(b) With the help of neat diagrams, explain the process of regeneration in *Planaria*. 3

Ans. (a) Because these methods involve only one parent / organisms are formed as a result of mitotic division / progeny (organisms) are similar in their genetic makeup and no variations. **(any one) 1**

(b)
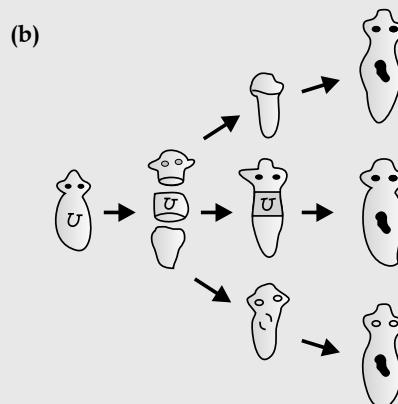
1

(i) Planaria can be cut into any number of pieces and each piece grows through specialized cells into a complete organism. **1**

(CBSE Marking Scheme, 2019)

SECTION - D

16. A 6 cm tall object is placed perpendicular to the principal axis of a concave mirror of focal length 30 cm. The distance of the object from the mirror is 45 cm. Use mirror formula to determine the position, nature and size of the image formed. Also, draw labelled ray diagram to show the image formation in this case.

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.

Ans. Given:

$h = 6$ cm
$f = -30$ cm
$v = -45$ cm

By mirror formula,

$$\frac{1}{f} = \frac{1}{v} + \frac{1}{u} \qquad \text{½}$$

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

$$= -\frac{1}{30} - \frac{1}{(-45)}$$

$$= -\frac{1}{30} + \frac{1}{45} = -\frac{1}{90} \qquad \text{½}$$
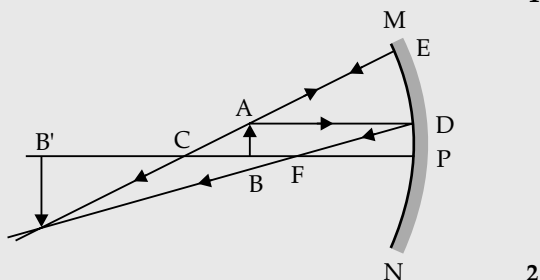
$f = -90$ cm from the pole of mirror

Size of the image

$$m = \frac{-v}{u} \qquad \text{½}$$

$$= -\frac{90}{45} = -2$$

$$h' = -2 \times 6 \text{ cm}$$

$$= -12 \text{ cm} \qquad \text{½}$$

Image formed will be real, inverted and enlarged. **1**

Well labelled diagram
(CBSE Marking Scheme, 2019) **2**

OR

Given:

$f = +30$ cm

$u = -50$ cm

$h = -6.0$ cm

lens formula

$$\frac{1}{f} = \frac{1}{v} - \frac{1}{u} \qquad \text{½}$$

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

$$= \frac{1}{30} - \frac{1}{50}$$
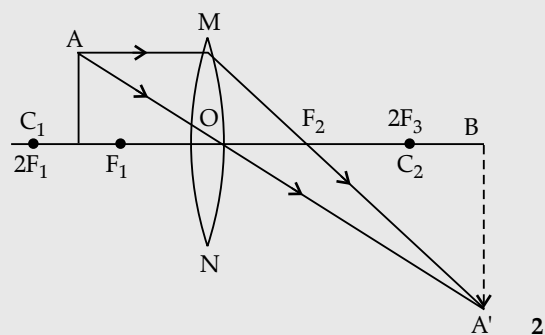
$$\frac{5-3}{150} = \frac{2}{150} = \frac{1}{75}$$

$$\therefore \qquad v = +75 \text{ cm} \qquad \text{½}$$

$$m = \frac{v}{u} - \frac{h_1}{h} \qquad \text{½}$$

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

$$h_1 = -9 \text{ cm} \qquad \text{½}$$

Image formed is real, inverted and enlarged **1**

Well labelled diagram
(CBSE Marking Scheme, 2019) **2**

20. What is sexual reproduction ? Explain how this mode of reproduction give rise to more viable variations than asexual reproduction ? How does this affect the evolution ? **5**

Ans. ● When male and female organisms are involved in producing young ones, is known as sexual reproduction / Gametes from two organisms of opposite sex must fuse to produce young ones. **1**

● Gametes (germs cells) produced are the products of meiosis / due to combining of DNA from two individuals, this results in mixing of characters and causes variations. **1 + 1**

● In asexual reproduction, single parent produces young ones. There is no mixing of characters. **1**

● More variations help in the process of evolution. Helpful variations accumulate over time and produce new species and result in evolution. **1**

(CBSE Marking Scheme, 2019)

❑❑