Class-X Session 2022-23
Subject - Science (086)
Sample Question Paper - 34
With Solution

BLUE PRINT

S. No.	Chapter Name	Section-A (MCQs & A/R) 1 Mark	Section-B (VSAQs) 2 Marks	Section-C (SAQs) 3 Marks	Section-D (LAQs) 5 Marks	Section-E (Case Study) 4 Marks	Total Marks
		Q. No.	Q. No.	Q. No.	Q. No.	Q. No.	
1	Chemical Reactions and Equations	1(Q4)		1(Q27)		1(Q37)	8
2	Acids, Bases and Salts	3(Q3,6,17)	1(Q21)				5
3	Metals and Non-metals	1(Q1)			1(Q34)		6
4	Carbon and its Compounds	3(Q2,5,7)	1(Q21 OR)	1(Q28)			6
5	Life Processes	2(Q8,13)	1(Q22)			1(Q38)	8
6	Control and Co-ordination	1(Q19)	1(Q25)				3
7	How do Organism Reproduce	2(Q16,20)	1(Q26)	1(Q31)			7
8	Heredity and Evolution	2(Q14,15)	1(Q24)	1(Q33)			7
9	Light- Reflection and Refraction	2(Q10,12)		1(Q32)			5
10	Human Eye and Colourful World			1(Q29)		1(Q39)	7
11	Electricity	3(Q9,11,18)	1(Q23)	1(Q30)			8
12	Magnetic Effects of Electric Current				1(Q35)		5
13	Our Environment				1(Q36)		5
	* Total Questions (Total Marks)	20(20)	6(12)	7(21)	3(15)	3(12)	80

* The number given outside the bracket denotes number of questions asked in the sample paper, while the number given inside the bracket denotes marks.

Time Allowed : 3 Hours **Max. Marks : 80**

General Instructions

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

SECTION-A

Select and write one most appropriate option out of the four options given for each of the Questions 1 to 20

1. The ability of metals to be drawn into thin wire is known as

(a) ductility (b) malleability (c) sonorousity (d) conductivity

2. Which of the following does not belong to the same homologous series?

(a) CH_4 (b) C_2H_6 (c) C_3H_8 (d) C_4H_8

3. Which of the following statement is true for acids?

(a) Bitter and change red litmus to blue (b) Sour and change red litmus to blue

(c) Sour and change blue litmus to red (d) Bitter and change blue litmus to red

4. Ferrous sulphate does not produce on heating

(a) ferric oxide (b) sulphur dioxide

(c) oxygen (d) water

5. Glacial acetic acid is –

(a) 100% acetic acid free of water (b) solidified acetic acid

(c) gaseous acetic acid (d) frozen acetic acid

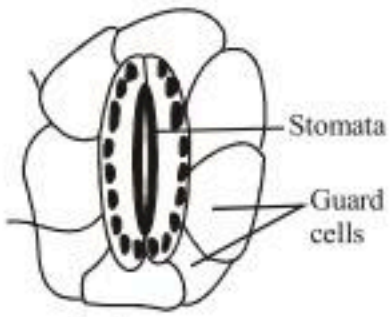
6. The pH of the gastric juices released during digestion is

(a) less than 7 (b) more than 7 (c) equal to 7 (d) equal to 0

7. When methane is burnt in an excess of air, the products of combustion are –

(a) C and H_2O (b) CO and H_2O (c) CO_2 and H_2 (d) CO_2 and H_2O

8. Which one of the following conditions is true for the state of stomata of a green leaf shown in the given diagram?



(a) Large amount of water flows into the guard cells.

(b) Gaseous exchange is occurring in large amount.

(c) Large amount of water flows out from the guard cells.

(d) Large amount of sugar collects in the guard cells.

9. A 24V potential difference is applied across a parallel combination of four 6 ohm resistor. The current in each resistor is
   (a) 1 A (b) 4 A
   (c) 16 A (d) 36 A
10. Which of the following lenses would you prefer to use while reading small letters found in a dictionary?
   (a) A convex lens of focal length 50 cm (b) A concave lens of focal length 50 cm
   (c) A convex lens of focal length 5 cm (d) A concave lens of focal length 5 cm
11. The filament of an electric bulb is of tungsten because
   (a) Its resistance is negligible (b) It is cheaper
   (c) Its melting point is high (d) Filament is easily made
12. Focal length of a lens is 25 cm. In dioptre, power of lens will be
   (a) 0.04 (b) 0.4
   (c) 4 (d) 2.5
13. Identify the two components of Phloem tissue that help in transportation of food in plants
   (a) Phloem parenchyma & sieve tubes (b) Sieve tubes & companion cells
   (c) Phloem parenchyma & companion cells (d) Phloem fibres and sieve tubes
14. A complete set of chromosomes inherited as a unit from one parent, is known as
   (a) Karyotype (b) Gene pool
   (c) Genome (d) Genotype
15. Mendel's law of segregation is based on separation of alleles during
   (a) gametes formation (b) seed formation
   (c) pollination (d) embryonic development
16. Puberty in males comes between or is at.
   (a) 10 - 14 years (b) 12 - 15 years
   (c) 13 - 16 years (d) 14 years

Directions: Q.No. 17–20 are Assertion - Reasoning based questions: These consist of two statements – Assertion (A) and Reason (R). Answer these questions selecting the appropriate option given below:

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

17. **Assertion :** H_3PO_4 and H_2SO_4 are known as polybasic acids.
   Reason : They have two or more than two protons per molecule of the acid.
18. **Assertion:** Resistance of a copper wire of length 1 metre and area of cross-section 1 mm^2 is same as the resistance of an aluminium wire of length 1 metre and area of cross-section of 1 mm^2.
   Reason: Resistance of a metallic conductor depends on the nature of the material of the conductor.
19. **Assertion:** Suppression of growth of axillary buds is called apical dominance.
   Reason: It is due to effect of downward movement of auxin from apical region towards the lower side.
20. **Assertion:** The cardiac muscular walls of ventricle are thicker than auricles.
   Reason: This help to prevent the backflow of the blood into chamber.

SECTION-B

Q. no. 21 to 26 are Very Short Answer Questions.

21. Name the products formed from chlor-alkali process.

OR

Write the molecular formula of first two members of homologous series having functional group - Cl.

22. What is the importance of transpiration?

23. Define electric current. Name the particles that constitute electric current flowing through the metallic wires.

OR

Show four different ways in which three resistors of 'r' ohm each may be connected in a circuit. In which case is the equivalent resistance of the combination:

(i) Maximum (ii) Minimum

24. Differentiate between phototropism and geotropism?

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

26. Name the reproductive parts of an angiosperm. Where are these parts located? Explain the structure of its male reproductive part.

OR

What is puberty? Mention any two changes that are common to both boys and girls in early teenage years.

SECTION-C

Q.no. 27 to 33 are Short Answer Questions.

27. Define the term decomposition reaction. Give one example each of thermal decomposition and electrolytic decomposition.

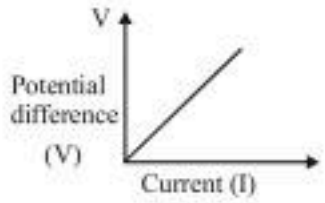
28. Give the molecular formula of one homologues of each of the following:

(a) C_6H_{14} (b) C_3H_6 (c) C_4H_8

29. (a) With the help of labelled ray diagram show the path followed by a narrow beam of monochromatic light when it passes through a glass prism.

(b) What would happen if this beam is replaced by a narrow beam of white light?

30. V–I graph for a conductor is as shown in figure.



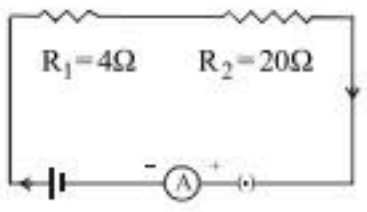
(i) What do you infer from this graph?

(ii) State the law expressed here.

(iii) Name the physical quantity represented by the slope of this graph and state its SI unit.

OR

In the given circuit, calculate:



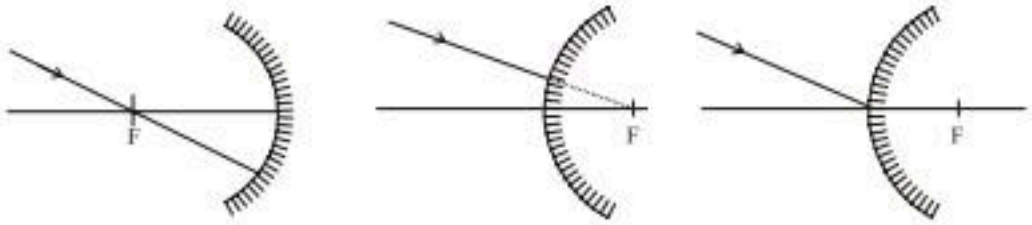
(i) the total resistance of the circuit

(ii) the current through the circuit, and

(iii) the potential difference across R_1 and R_2

31. Explain the process of regeneration in planaria. How is this process different from reproduction?

32. Draw the following diagram, in which a ray of light is incident on a concave/convex mirror, on your answer sheet. Show the path of this ray, after reflection, in each case.



33. A green stemmed tomato plant denoted by (GG) is crossed with a tomato plant with purple stem denoted by (gg).

(i) What colour of the stem would you expect in their F1 progeny ?

(ii) In what ratio would you find the green and purple coloured stem in plants of F2 progeny ?

(iii) What conclusion can be drawn for the above observations?

SECTION-D

Q.no. 34 to 36 are Long Answer Questions.

34. (a) Give reasons for the following:

(i) Metals are regarded as electropositive elements.

(ii) Articles made of aluminium do not corrode even though aluminium is an active metal.

(b) On placing a piece of zinc metal in a solution of mercuric chloride it acquires a shining silvery surface but when it is placed in a solution of magnesium sulphate no change is observed. Give reason.

OR

(a) When a metal *X* is treated with cold water, it gives a basic salt *Y* with molecular formula XOH (molecular mass = 40) and liberates a gas Z which easily catches fire. Identify X, Y and Z and also write the reaction involved.

(b) Which two metals do not corrode easily? Give an example in each case to support that:

(i) Corrosion of some metals is an advantage.

(ii) Corrosion of some metals is a serious problem.

35. (i) What is meant by the terms alternating current and direct current?

(ii) Name a source of alternating current and a source of direct current.

(iii) Mention the frequency of AC supply in India.

(iv) State two important advantages of alternating current over direct current.

36. What is the meaning of the effect of energy in an ecosystem ? Explain with example how energy is lost at the various energy levels.

SECTION-E

Q.no. 37 to 39 are case - based/data -based questions with 2 to 3 short sub - parts. Internal choice is provided in one of these sub-parts.

37. Read the following case/passage and answer the questions.

Chemistry in Automobiles:

For an internal combustion engine to move a vehicle down the road, it must convert the energy stored in the fuel into mechanical energy to drive the wheels. In your car, the distributor and battery provide this starting energy by creating an electrical "spark", which helps in combustion of fuels like gasoline. Below is the reaction depicting complete combustion of gasoline in full supply of air:

$2C_8H_{18}(l) + 25O_2(g) \longrightarrow 16\ 'X' + Y$

(a) What are 'X' and 'Y' ? What types of chemical reaction occuring during the combustion of fuel?

(b) What is the reason of inactivity of nitrogen in combustion reaction although it is the most abundant gas in the atmosphere?

OR

(b) What happens when combustion of fuel happens in limited air supply?

38. Read the following case/passage and answer the questions.

The heart is a tough operating mechanism which moves blood around the body through a very advanced system called arteries and capillaries, the blood is then carried back to the heard by means of veins. Blood pressure is the thrust of this blood in the body pushing up against the inside wall of the arteries as the heart is pumping.

(i) What is responsible for generating blood pressure?

(ii) What is the normal Blood pressure range?

(iii) What happens when the decrease in blood volume is greater that 10%?

(iv) Draw the graphs that best describe the blood pressure (Bp) change when blood moves from aorta to capillaries?

39. Read the following case/passage and answer the questions.

When a ray of light enters the eye, it is refracted at the cornea. This refraction produces a real inverted and diminished image of distant objects on the retina. When the object is kept at different distances then, we may expect the image to be formed at different distances from the lens. It means, it may not form on the retina always. When eye loses its ability to adjust its focal length, person is unable to view nearby or far away objects.

(a) A person having a myopic eye uses a concave lens of focal length 50 cm. What is the power of the lens ?

(b) A person having the nearest distance of distinct vision of 32 cm uses a reading lens of 8 cm focal length. What is the magnification of his reading lens ?

(c) What is the far point and near point of the human eye with normal vision ?

OR

(c) The far point of a myopic person is 80 cm in front of the eye. What is the nature and power of the lens required to correct the problem ?

Solution

SAMPLE PAPER-6

1. **(a)** The ability of metals to be drawn into thin wire is known as ductility.

2. **(d)** C_4H_8 belongs to C_nH_{2n} series.

3. **(c)** Acids are those chemical substances which have a sour taste and turn blue litmus solution to red.

4. **(d)** $4FeSO_4 \longrightarrow 2Fe_2O_3 + 4SO_2 + O_2\downarrow$

5. **(a)** Factual

6. **(a)** Our stomach produces hydrochloric acid (pH < 7) which helps in digesting our food.

7. **(d)**

8. **(b)** Tiny pores (called stomata) present on the surface of the leaves. Massive amounts of gaseous exchange takes place in the leaves through these pores for the purpose of photosynthesis.

9. **(b)**

10. **(c)** A convex lens of focal length 5 cm. (Because its magnification is more than others as it is inversely proportional to the focal length $\left(m = \frac{v}{f} - 1\right)$).

11. **(c)**

12. **(c)** Focal length of a lens, F = 25 cm

$f = 0.25$ m

$$P = \frac{1}{f} = \frac{1}{0.25} = 4D$$

13. **(b)** Phloem is a permanent complex tissue of the plant that helps in the transportation of food. Sieve tubes and companion cells are the two components of phloem tissue that transport food bidirectional.

14. **(c)** A complete set of chromosomes inherited as a unit from one parent is known as genome.

15. **(a)** Mendel's law of segregation state's that allele pairs separate or segregate during gametic formation and randomly unite at fertilisation.

16. **(c)** puberty starts in boys in between 10 and 13 and continues to grow till 16.

17. **(a)** $H_3PO_4 \rightleftharpoons H_2PO_4^- + H^+$

$H_2PO_4^- \rightleftharpoons H^+ + HPO_4^{2-}$

$HPO_4^{2-} \rightleftharpoons H^+ + PO_4^{3-}$

Similarly, bases which give two or more than two hydroxyl ions per molecule are known as polyacidic bases.

18. **(d)** The resistance depend on the material of which it is made and can be expressed as:

$R = \rho L / A$

where

R = resistance (ohm)

ρ = resistivity coefficient (ohm m)

L = length of wire (m)

A = cross sectional area of wire (m^2)

The factor in the resistance which takes into account the nature of the material is the resistivity.

19. **(a)** In many plant species, the growth of axillary meristems in inhibited by the primary shoot or primary inflorescence. This phenomenon is generally known as apical dominance. Auxin has an inhibitory effect on the growth of axillary buds.

20. **(b)** Ventricles have thicker walls than auricles because they have to pump blood to different organs and the pressure with which the blood flows through them is more than the auricles. While valves are present in the heart to prevent backflow of the blood.

21. NaOH and Cl_2 are the products that are formed in a chlor-alkali process. (2 marks)

OR

The molecular formula of two consecutive members of this series is CH_3Cl (chloromethane) and C_2H_5Cl (chloroethane). (2 marks)

22. The importance of transpiration :

(i) Ascent of sap- Transpiration makes possible for the water to be raised from the xylem of the roots to the top of the plant by producing suction force (Transpiration pull).

(ii) It helps in removal of excess of water.

(iii) It causes cooling effect.

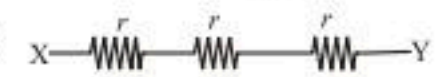
(iv) It helps in absorption and distribution of salts.

(4 × 1½ = 2 marks)

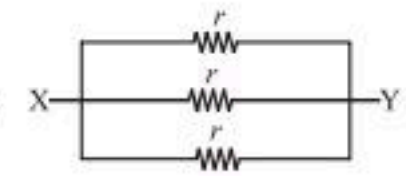
23. The flow of electric charges across a cross-section of a conductor in unit time constitutes an electric current. Electrons. (1 + 1 = 2 marks)

OR

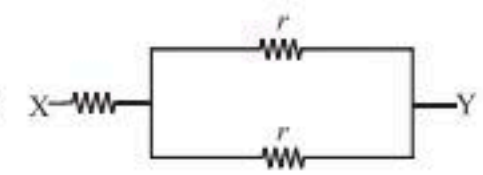
(a)



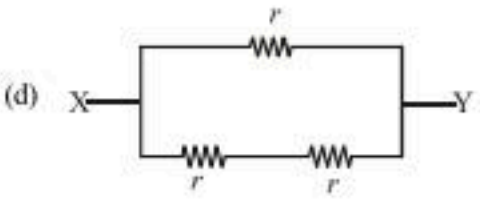
(b)



(c)



(d)



(i) Circuit (a) have maximum resistance

(ii) Circuit (b) have minimum resistance (½ × 4 = 2 marks)

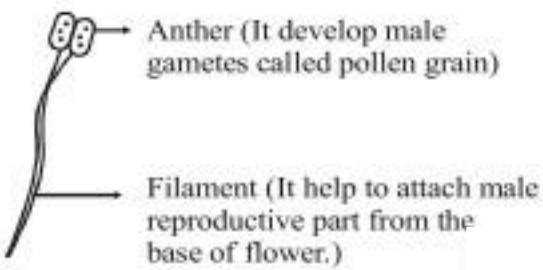
24.

	Phototropism		Geotropism
(i)	In this process, the growing plant bends towards light.	(i)	In this process, the plant bends towards gravity.
(ii)	Stem is positively phototropic.	(ii)	Stem is negatively geotropic.
(iii)	Root is negatively phototropic.	(iii)	Roots are positively geotropic.

(1 + 1 = 2 marks)

25. (i) Auxin (ii) Abscisic acid (1 + 1 = 2 marks)

26. The male reproductive part of an angiospermic plants is stamen and female is called carpel. It is located in the flower. Male reproductive part consist of two parts-



(1 + 1 = 2 marks)

OR

- Puberty is the phase in humans, when a boy or girl reach to their sexual maturity. (1 mark)
- Two changes that are common to both boys and girls in early teenage years are–
  (i) Releasing of hormones.
  (ii) Growth of public hair, facial hair and increasing in height. (2 × ½ = 1 mark)

27. The reaction in which single reactant breaks down into two or more simpler product is known as decomposition reaction. When a reaction is carried out in the presence of heat is called thermal decomposition reaction.

$$CaCO_3(s) \xrightarrow{\text{Heat}} CaO(s) + CO_2(g)$$

When a decomposition reaction is carried out by electric current, it is called as electrolytic decomposition.

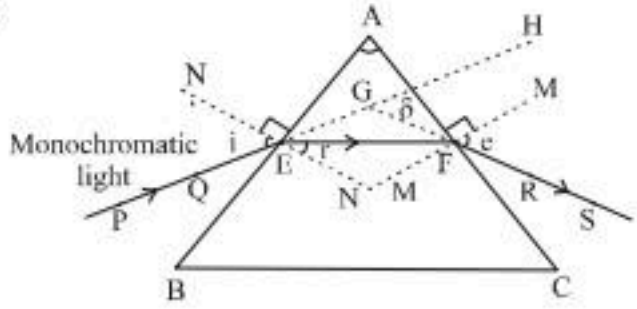
$$2H_2O(l) \xrightarrow{\text{Electric current}} 2H_2(g) + O_2(g)$$ (3 marks)

28. (a) $C_5H_{12}(C_nH_{2n+2})$

(b) $C_2H_4(C_nH_{2n})$

(iii) $C_5H_{10}(C_nH_{2n})$ (1×3 = 3 marks)

29. (a)



PE – Incident ray ∠i – Angle of incidence

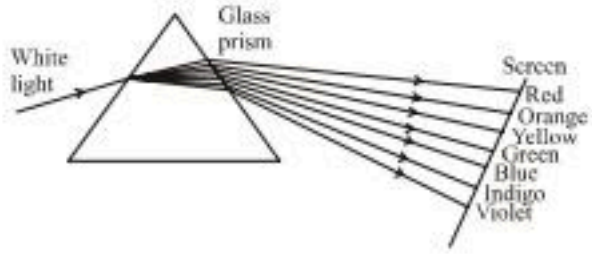
EF – Refracted ray ∠r – Angle of refraction

FS – Emergent ray ∠e – Angle of emergence

∠A – Angle of the prism ∠δ – Angle of deviation

(2 marks)

(b) When a narrow beam of white light passes through a prism, it emerges as a spectrum of all components of white light. (see the fig.)



(1 mark)

30. (i) The graph show that $V \propto I$ (1 mark)

(ii) It states that the current passing through a conductors is directly proportional to the potential difference across its ends, provided the physical conditions like temperature, density, etc, remain unchanged. This is ohm's law. (1 mark)

(iii) **Slope of graph gives** resistance of a conductor and its unit is Ohm (Ω). (1 mark)

OR

Given, The resistance of conductor $R1_1 = 4\Omega$

The resistance of conductor $R_2 = 20\Omega$

(i) The total resistance of the circuit

$R = R_1 + R_2$ (series combintion)

$R = 4 + 20 = 24\Omega$ (1 mark)

(ii) Now by ohm's Law, The current through the circuit,

$$V = IR \Rightarrow I = \frac{V}{R} = \frac{6}{24} = \Rightarrow = 0.25 \text{ Amp.}$$ (1 mark)

(iii) The potential difference across the two terminals of the battery = 6V.

$V_1 = I \times R_1$

$= 0.25 \times 4 = 1V$ (Potential difference across the conductor R_1)

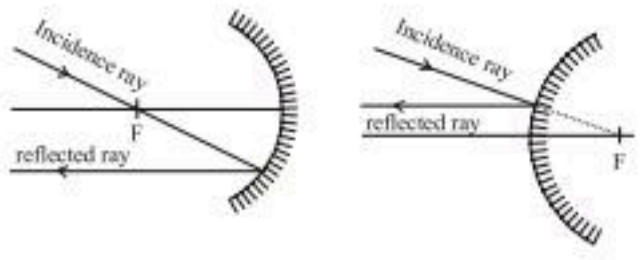
$V_2 = I \times R_2$

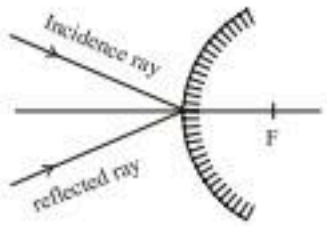
$= 0.25 \times 20 = 5V$ (Potential difference across the conductor R_2) (1 mark)

31. When *Planaria* is cut into many pieces, each piece grows into a complete organism; this regeneration process is carried out by specialized cell or regenerative cell ; which proliferate; develop and differentiate into various cell types and tissues.

Regeneration is not same as reproduction as most of the organisms would not normally depend on being cut up to be able to reproduce. (3 marks)

32.





(1 × 3 = 3 marks)

33. (i)

Green stem — Purple Stem

Parent – GG — gg

↓ — ↓

gamete – G — g

↓

f_1 Gen – Gg (green stem)

f_1 progeny must be like their dominant parent with green stemmed tomato plant. (1 mark)

(ii) f_2 Gen

	G	g
G	GG	Gg
g	Gg	gg

Phenotype ratio → GG : Gg : Gg : gg

(green stem) (purple stem)

Hence, the Ratio for green stem and purple stem is 3:1 respectivily. (1 mark)

(iii) The above observation show law of dominances. (1 mark)

34. (a) (i) An electropositive element is the one that has tendency to lose electrons and form positively charged ion. Metals like Na, Mg, K, Ca, Fe lose electrons and form positively charged ion. Due to this, metals are called electropositive elements. (1 mark)

(ii) Aluminium is a reactive metal and reacts readily with moisture and water. On reaction, it forms a layer of aluminium oxide (Al_2O_3), which acts as a non-penetrating layer and protects aluminium from being corrode. (1 mark)

(b) When zinc metal is placed in solution of mercuric chloride, Zn displaces mercury and a shining silvery surface is formed because zinc is more reactive than mercury.

$Zn(s) + HgCl_2(aq) \longrightarrow ZnCl_2(aq) + Hg(l)$

When zinc metal is placed in $MgSO_4$ solution, no reaction takes place because Zn is less reactive than Mg, therefore, it cannot displace Mg from $MgSO_4$. (3 marks)

OR

(a) X — Na; Y — NaOH; Z — H_2

$2Na(s) + 2H_2O(l) \longrightarrow 2NaOH(aq) + H_2(g) + Heat$

(1+1=2 marks)

(b) Gold and platinum are the two metals that do not corrode easily. (1 mark)

(i) Corrosion of some metals is an advantage. For example: a thin impervious layer of aluminium oxide forms a protective layer which protects the aluminium metals underneath from further damage. (1 mark)

(ii) Corrosion of metal is a serious problem. For example: corrosion of iron in the presence of oxygen and air leads to formation of brown solid known as rust. It causes damage to car bodies, bridges, ships, iron railings and all objects made of metals (specially iron). (1 mark)

35. (i) **Alternating Current:** If the current changes direction after equal intervals of time i.e. periodically change its direction and magnitude, it is called alternating current. The positive and negative polarities of AC are not fixed.

Direct Current: If the current always flows in the same direction i.e. magnitude and direction does not

vary with time, it is called direct current. It can be obtained from a cell or a bettery. The positive and negative polarities of DC are fixed for long distance transmission. AC is preferred as it caused minimum loss of energy during transmission. (2 marks)

(ii) Source of AC current - electric generator.
Source of DC current - electric cell. (1 mark)

(iii) Frequency of alternating current in India is 50 Hz. (1 mark)

(iv) (a) Alternating current reverse its direction periodically but direct current always flow in one direction.

(b) AC electric power can be transmitted over long distances without much loss of energy while DC not. (1 mark)

36. In the ecosystem, there is continuous and unidirectional flow of energy. The energy from the sun through the various energy levels finally reaches the tertiary consumers. These various energy levels are joined by a food chain. Many food chains overlap and form a food web. (2 marks)

Loss of energy at different levels

Trapped energy is fixed in the form of complex organic compounds and is used by herbivorous and carnivorous animals. But the energy does not terminate or end here. When the organism dies, then the dead body gets mixed with the soil. Indirectly it can be said that the complex energy rich compounds from the dead body are now utilized by decomposers or scavangers, and then ultimately energy is released back into nature after decomposition. Thus, we see at every level, organisms make use of energy and as a result of use of energy when life activity occurs then energy is lost and therefore, supply of energy is continuously required from the sun. (3 marks)

37. (a) $2C_8H_{18}(l) + 25O_2(g) \longrightarrow \underset{\text{'X'}}{16CO_2(g)} + \underset{\text{'Y'}}{18H_2O(g)}$

(½ + ½ = 1 mark)

Thus is an exothermic oxidation reaction. (1 mark)

(b) Nitrogen acts as an inert gas since it has triple bonds which are covalent in nature. The nature of bond is very strong. So, it requires a large amount of energy to break apart two 'N' atoms and take part in the combustion reaction under normal atmospheric condition.

Note : In chemistry laboratory, nitrogen gas is used to make reaction atmosphere inert. But, for sensitive reaction, helium gas is used for creating inert atmosphere (2 marks)

OR

(b) Limited supply of air leads to partial combustion of fuel. As a result, carbon monoxide (CO) gas is produced and black smoke is created.

$$C_3H_8(g) + \frac{3}{2}O_2(g) \longrightarrow 3CO(g) + 4H_2(g)$$

(Partial combustion)

$$C_3H_8(g) + 5O_2(g) \longrightarrow 3CO_2(g) + 4H_2(g)$$

(Complete combustion)

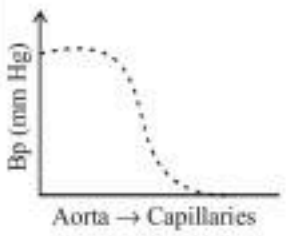
(2 marks)

38. **(i)** Contraction of ventricle region is responsible for generating blood pressure.

(ii) 120/80 mm Hg.

(iii) When the decrease in blood volume is greater than 10% the blood presure on decrease at higher %.

(iv)



39. **(a)** Focal length, f = – 50 cm (concave lens)

Now, Power,

$$P = \frac{1}{f \text{ (in metre)}} = \frac{1}{-\frac{50}{100}\text{m}} = -\frac{100}{50} = -2$$ (1 mark)

Thus, the power of this concave lens is –2 dioptres

(b) $\frac{1}{v} - \frac{1}{u} = \frac{1}{f}$

$v = -32$ cm, $f = 8$ cm,

$\therefore \quad u = -32/5$

Now $m = v/u = 5$ (1 mark)

(c) A healthy human eye can see the objects at infinity distinctly. So far point is infinity. The eye can also see the nearly objects beyond 25 cm. (2 marks)

OR

The lens used for correcting the disease is concave lens

$$P = -\frac{1}{\text{far point (metre)}} = -\frac{1}{80 \text{ cm}} = \frac{-100}{80}$$

$= -1.25$ D. (2 marks)