

CONTENTS

- ◆ **Latest CBSE Examination Paper 2020**



[Click Here](#)

- ◆ **Latest CBSE Examination Paper 2019**



[Click Here](#)

CBSE Examination Paper, 2020

[Delhi (Set I, II, III)]

Time Allowed: 3 Hours]

[Maximum Marks: 80

General Instructions:

Read the following instructions very carefully and strictly follow them:

- (i) Question paper comprises three sections – **A, B** and **C**.
There are 30 questions in the question paper. All questions are compulsory.
 - (ii) **Section A** – question no. **1 to 14** – all questions or part thereof are of one mark each. These questions comprises multiple choice questions (MCQ), very short answer (VSA) and Assertion-Reason type questions. Answer to these questions should be given in one word or one sentence.
 - (iii) **Section B** – question no. **15 to 24** are short answer type questions, carrying 3 marks each. Answer to these questions should not exceed 50 to 60 words.
 - (iv) **Section C** – question no. **25 to 30** are long answer type questions, carrying 5 marks each. Answer to these questions should not exceed 80 to 90 words.
 - (v) Answer should be brief and to the point. Also the above mentioned word limit be adhered to as far as possible.
 - (vi) There is no overall choice in the question paper. However, an internal choice has been provided in some questions in each Section. Only one of the choices in such questions have to be attempted.
 - (vii) In addition to this, separate instructions are given with each section and question, wherever necessary.
-

Set-I

SECTION-A

1. Name a cyclic unsaturated carbon compound.

Ans. Benzene is cyclic unsaturated carbon compound.

2. The change in magnetic field lines in a coil is the cause of induced electric current in it. Name the underlying phenomenon.

Ans. Electromagnetic Induction

3. The growing size of the human population is a cause of concern for all people. The rate of birth and death in a given population will determine its size. Reproduction is the process by which organisms increase their population. The process of sexual maturation for reproduction is gradual and takes place while general body growth is still going on. Some degree of sexual maturation does not necessarily

(viii)

mean that the mind or body is ready for sexual acts or for having and bringing up children. Various contraceptive devices are being used by human beings to control the size of population.

(a) List two common signs of sexual maturation in body and girls.

Ans. (i) Thick hair development in underarm and genital area.

(ii) Deepening of voice

(b) What is the result of reckless female foeticide?

Ans. It is the practice of killing female foeticide and it has led to various problems in population balance and it reduces the number of female child per male child, which is not good sign of a healthy population in a particular area.

(c) Which contraceptive method changes the hormonal balance of the body?

Ans. The chemical contraceptive methods such as oral pills and vaginal pills change the hormonal imbalance of the body.

(d) Write two factors that determine the size of a population.

Ans. (i) Birth rate

(ii) Death rate

- 4. Human body is made up of five important components of which water is the main component. Food as well as potable water are essential for every human being. The food is obtained from plants through agriculture. Pesticides are being used extensively for a high yield in the fields. These pesticides are absorbed by the plants from the soil along with water and minerals and from the water bodies these pesticides are taken up by the aquatic animals and plants. As these chemicals are not biodegradable, they get accumulated progressively at each trophic level. The maximum concentration of these chemicals gets accumulated in our bodies and greatly affects the health of our mind and body.**

(a) Why is the maximum concentration of pesticides found in human beings?

Ans. This is due to the fact that human beings are at the top trophic level in most of the food chains.

(b) Give one method which could be applied to reduce our intake of pesticides through food to some extent.

Ans. Washing vegetables and fruits is an excellent method which could be applied to reduce the intake of pesticides through food.

(c) Various steps in a food chain represent:

(i) Food web

(ii) Trophic level

(iii) Ecosystem

(iv) Biomagnification

Ans. (ii) Trophic level

8. The chemical formula for Plaster of Paris is:

- (a) $\text{CaSO}_4 \cdot 2\text{H}_2\text{O}$ (b) $\text{CaSO}_4 \cdot \text{H}_2\text{O}$
(c) $\text{CaSO}_4 \cdot \frac{1}{2}\text{H}_2\text{O}$ (d) $2\text{CaSO}_4 \cdot \text{H}_2\text{O}$

Ans. (a) $\text{CaSO}_4 \cdot \frac{1}{2}\text{H}_2\text{O}$ is Plaster of Paris.

9. The laws of reflection hold true for:

- (a) plane mirrors only (b) concave mirrors only
(c) convex mirror only (d) all reflecting surfaces

Ans. (d) all reflecting surfaces

Or

When an object is kept within the focus of a concave mirror, an enlarged image is formed behind the mirror. This image is:

- (a) real (b) inverted
(c) virtual and inverted (d) virtual and erect

Ans. (d) virtual and erect

10. At the time of short circuit, the electric current in the circuit:

- (a) vary continuously (b) does not change
(c) reduces substantially (d) increases heavily

Ans. (d) increases heavily

Or

Two bulbs of 100 W and 40 W are connected in series. The current through the 100 W bulb is 1 A. The current through the 40 W bulb will be:

- (a) 0.4 A (b) 0.6 A
(c) 0.8 A (d) 1 A

Ans. (d) 1 A

11. Which one of the following is responsible for the sustenance of underground water?

- (a) Loss of vegetation cover
(b) Diversion for high water demanding crops
(c) Pollution from urban wastes
(d) Afforestation

Ans. (d) Afforestation

12. Incomplete combustion of coal and petroleum:

(A) increases air pollution.

(B) increases efficiency of machines.

(C) reduces global warming.

(D) produce poisonous gases.

The correct option is:

(a) (A) and (B)

(b) (A) and (D)

(c) (B) and (C)

(d) (C) and (D)

Ans. (b) (A) and (D)

For question numbers 13 and 14, two statements are given – one labelled Assertion (A) and the other labelled Reason (R). Select the correct answer to these questions from the codes (a), (b), (c) and (d) as given below:

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

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

(c) A is true but R is false.

(d) A is false but R is true.

13. Assertion (A): Esterification is a process in which a sweet smelling substance is produced.

Reason (R): When esters react with sodium hydroxide an alcohol and sodium salt of carboxylic acid are obtained.

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

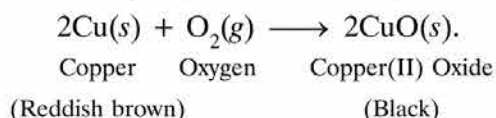
14. Assertion (A): In the process of nuclear fission, the amount of nuclear energy generated by the fission of an atom of uranium is so tremendous that it produces 10 million times the energy produced by the combustion of an atom of carbon from coal.

Reason (R): The nucleus of a heavy atom such as uranium, when bombarded with low energy neutrons, splits apart into lighter nuclei. The mass difference between the original nucleus and the product nuclei gets converted to tremendous energy.

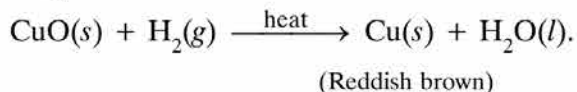
Ans. (a) Both A and R are true and R is correct explanation of the Assertion.

15. 1 g of copper powder was taken in a China dish and heated. What change takes place on heating? When hydrogen gas is passed over this heated substance, a visible change is seen in it. Give the chemical equations of reactions, the name and the colour of the products formed in each case.

Ans. Reddish brown copper powder will change to black coloured copper oxide.



When hydrogen gas is passed over heated copper oxide, it changes to reddish brown copper again.

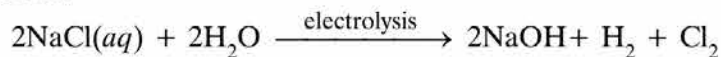


16. List the important products of the Chlor-alkali process. Write one important use of each.

Or

How is washing soda prepared from sodium carbonate? Give its chemical equation. State the type of this salt. Name the type of hardness of water which can be removed by it.

Ans. Chlorine gas, hydrogen gas and sodium hydroxide are products formed in chlor-alkali process.



Uses :

- Chlorine gas is used as disinfectant.
- Hydrogen gas is used in preparation of vegetable ghee from vegetable oil.
- Sodium hydroxide is used for manufacture of soap.

Or

Washing soda is prepared from sodium carbonate by crystallisation of saturated solution of sodium carbonate.



Sodium carbonate is basic salt because it is salt of strong base (NaOH) and weak acid (H_2CO_3).

It can be used for removal of permanent hardness of water.

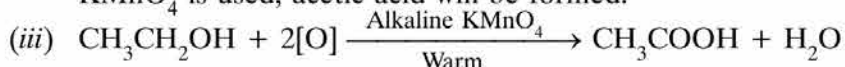
17. 3 mL of ethanol is taken in a test tube and warmed gently in a water bath. A 5% solution of alkaline potassium permanganate is added first drop by drop to this solution, then in excess.

(xiii)

- (i) How is 5% solution of KMnO_4 prepared?
- (ii) State the role of alkaline potassium permanganate in this reaction. What happens on adding it in excess?
- (iii) Write chemical equation of this reaction.

Ans. (i) 5% solution of KMnO_4 is prepared by dissolving 5g of KMnO_4 in 95g of water so that total mass of solution is 100.

(ii) Alkaline potassium permanganate acts as oxidising agent. If excess of alkaline KMnO_4 is used, acetic acid will be formed.



- 18. A squirrel is in a scary situation. Its body has to prepare for either fighting or running away. State the immediate changes that take place in its body so that the squirrel is able to either fight or run?**

Or

Why is chemical communication better than electrical impulses as a means of communication between cells in a multicellular organism?

Ans. Adrenaline hormone in large amount is secreted in its body when a squirrel is in scary situation and following immediate changes takes place in its body so that squirrel is able to either fight or run:

- (i) The heartbeat increases
- (ii) The breathing rate increases
- (iii) More glucose goes into blood to release energy which helps squirrel to either fight or run away.

Or

Chemical communication is better than electrical impulses as a means of communication between cells in a multicellular organism because:

- (i) Chemical communication can reach every part of the body while electrical impulses cannot reach each and every cell, it can reach only those cells which are connected by nervous tissue.
- (ii) Once the electrical impulse is generated in a cell and transmitted, it takes time to reset the mechanism before it can create and transmit a new impulse, while chemical communication is steady and a constant response.

- 19. Define the term pollination. Differentiate between self pollination and cross pollination. What is the significance of pollination?**

Ans. Pollination is the transfer of pollen grains from the anther of a stamen to the stigma of a carpel.

Differences between self pollination and cross pollination:

- (i) **Self-pollination:** It is the transfer of pollen grains from the anther to the stigma within a flower or between two flowers of the same plant.
- (ii) **Cross-pollination:** It is the transfer of pollen grains from anther to the stigma of two flowers on different plants of the same species.

Significance of Pollination: The process of pollination leads to fertilization as it brings the male and female gametes together for fusion. It is necessary for seed formation and stimulates the development of fruits.

20. What are homologous structures? Give an example. Is it necessary that homologous structures always have a common ancestor. Justify your answer.

Ans. Structures which have same basic design and developmental origin but have different functions and appearance are called homologous structures. Example: the forelimb of a frog, a lizard, a bird and a man have same structural design but perform different functions and hence are called homologous structure.

Since homologous organs (as in above example) have same basic origin to perform different functions in various vertebrates, so yes it is necessary that homologous structures have a common ancestor.

21. Why is Tyndall effect shown by colloidal particles? State four instances of observing the Tyndall effect.

Or

Differentiate between a glass slab and a glass prism. What happens when a narrow beam of (i) a monochromatic light, and (ii) white light passes through (a) glass slab and (b) glass prism?

Ans. Tyndall effect: Scattering of beam of visible light by the colloidal particles present in the colloidal solution is called Tyndall effect. It occurs when the dimension of the dispersed particle that are causing the scattering are larger than the wavelength of incident light i.e 10^{-7} m. Accordingly, the colour of the scattered light depends on the size of the scattering particles in colloidal solution.

Four instances of observing the Tyndall effect are

- (a) Headlight of a car shining through fog.
- (b) When a fine beam of sunlight enters a smoke-filled room through a small hole.

- (c) When sunlight passes through a canopy of a dense forest.
- (d) Blue colour of sky.

Or

The difference between glass slab and glass prism is that the opposite faces of a rectangular glass slab is parallel while the opposite faces of prism is not parallel to each other and are inclined at an angle.

(i) A Monochromatic Light Passes Through

- (a) **Glass slab:** the emergent beam is parallel to incident beam and is shifted sideward's slightly.
- (b) **Glass prism:** the emergent beam is not parallel to incident beam and bends towards the base of the prism.

(ii) White Light Passes Through

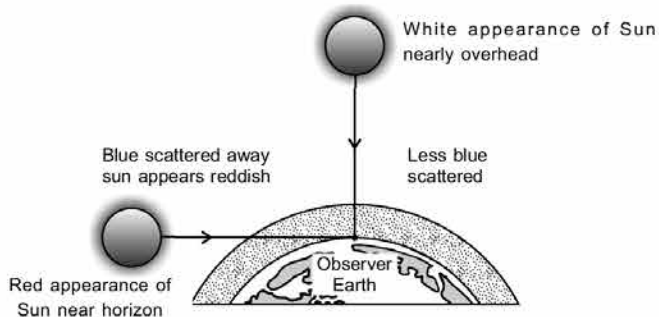
- (a) **Glass slab:** the emergent beam is parallel to incident beam and is shifted sideward's slightly. No dispersion occurs.
- (b) **Glass prism:** Dispersion occurs. The different colour of white light having different wavelengths deviates through different angles on passing through the prism and becomes distinct.

SECTION-B

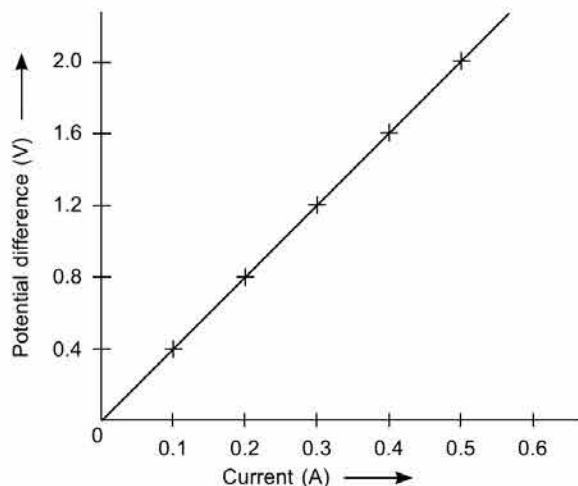
22. Draw a labelled diagram to show

- (i) reddish appearance of the sun at the sunrise or the sunset and**
- (ii) white appearance of the sun at noon when it is overhead.**

Ans.



23. A V-I graph for a nichrome wire is given below. What do you infer from this graph? Draw a labelled circuit diagram to obtained such a graph.



Ans. From the V-I graph for a nichrome wire, the straight line plot shows that as the current through a wire increases, the potential difference across the wire increases linearly – this is called Ohm’s law.

i.e.,

$$V \propto I$$

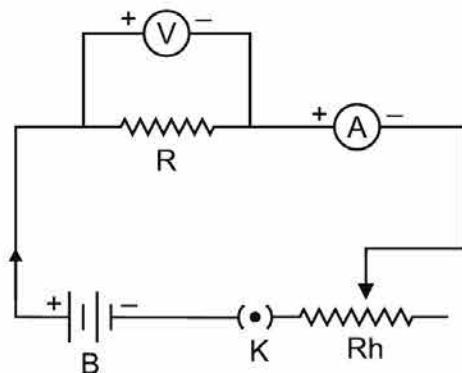
or

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

or

$$V = IR$$

Circuit Diagram



A = Ammeter
 V = Voltmeter
 R = Resistor
 B = Battery
 K = Key
 Rh = Rheostat

24. (a) Write the mathematical expression for Joule’s law of heating.
 (b) Compute the heat generated while transferring 96000 coulomb of charge in two hours through a potential difference of 40 V.

Ans. (a) Mathematical expressions for Joule's law of Heating

or
$$H = I^2Rt$$

Where,

H = Amount of Heat produced in a conductor

I = Current flowing through the conductor

R = Resistance of conductor

(b) Given: Charge(Q) = 96000 C; Time(t) = 2h; Potential difference (V) = 40 V

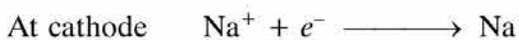
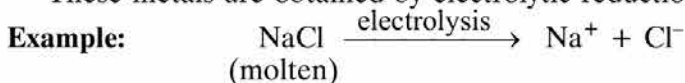
The heat generated,

$$\begin{aligned} H &= VIt \\ &= V \times \frac{Q}{t} \times t \\ &= V \times Q \\ &= 40 \times 96000 \text{ J} \\ &= 3840000 \text{ J} \\ &= 3.84 \times 10^6 \text{ J} \end{aligned}$$

25. Carbon cannot reduce the oxides of sodium, magnesium and aluminium to their respective metals. Why? Where are these metals placed in the reactivity series? How are these metals obtained from their ores? Take an example to explain the process of extraction along with chemical equations.

Ans. Sodium, Magnesium and Aluminium are strong reducing agents, therefore, oxide of Na, Mg and Al cannot be reduced by carbon.

- These metals are placed at the top of Activity series of metals. Na is at second position, Mg at 4th and 'Al' at 5th position.
- These metals are obtained by electrolytic reduction from their metal ores.



Sodium metal can be obtained by electrolysis of molten NaCl.

Na^+ will gain electron at cathode and form sodium metal.

Cl^- will lose electron to form chlorine gas at anode.

(xviii)

26. The position of certain elements in the Modern Periodic Table are shown below.

Group → ↓ Period	1	2	3 to 12	13	14	15	16	17	18
1	G								H
2	A			I			B		C
3		D			E				F

Using the above table answer the following questions giving reasons in each case:

- (i) Which element will form only covalent compounds?
- (ii) Which element is a non-metal with valency 2?
- (iii) Which element is a metal with valency 2?
- (iv) Out of H, C and F which has largest atomic size?
- (v) To which family does H, C and F belong?

Or

Define atomic size. Give its unit of measurement. In the modern periodic table what trend is observed in the atomic radius in a group and a period and why is it so?

- Ans.
- (i) 'E' will form only covalent compounds because it can share four electrons to become stable. Losing or gaining four electrons is difficult.
 - (ii) 'B' is non-metal with valency 2 because it can gain 2 electrons to become stable.
 - (iii) 'D' is metal with valency 2 because it can lose 2 electrons to become stable.
 - (iv) 'F' has largest atomic size because it has 3 shells.
 - (v) H, C, F belong to Noble gases because they have stable electronic configuration, 8 electrons in valence shell except H which has 2 electrons.

Or

- Atomic size is the distance between centre of nucleus and valence shell.
- Its unit of measurement is pm (picometre)
- Atomic size goes on increasing down the group because number of shells goes on increasing, effective nuclear charge decreases.
- Atomic size goes on decreasing along a period because effective nuclear charge increases, as number of shells remain the same but one proton and electron is being added successively.

27. (a) Why is there a difference in the rate of breathing between aquatic organisms and terrestrial organisms? Explain.

(b) Draw a diagram of human respiratory system and label – pharynx, trachea, lungs, diaphragm and alveolar sac on it.

(xix)

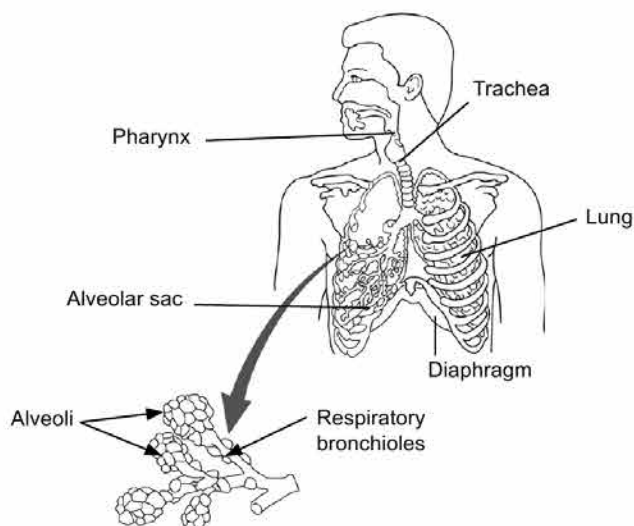
Or

(a) Name the organs that form the excretory system in human beings.

(b) Describe in brief how urine is produced in human body.

Ans. (a) Quantity of dissolved oxygen is fairly low in water as compared to the amount of oxygen in air. Aquatic organisms therefore have to breathe faster than terrestrial organisms to absorb the required amount of oxygen from the water.

(b)



Or

(a) The main organs that form the excretory system in human beings are: a pair of kidneys, a pair of ureters, urinary bladder and a urethra.

(b) The formation of urine in human body can be summarised as follows:

- (i) Kidneys are the basic functional unit of excretory system in human body, as the nitrogenous waste (urea or uric acid) is removed from blood in the kidneys.
- (ii) Each capillary cluster in the kidney is associated with the cup shaped end of a tube that collects the filtered urine. Nephrons are the large number of filtration units in each kidney.
- (iii) Some substances (glucose, amino acid, salt, water etc.) in the initial filtrate are selectively reabsorbed as the urine flows along the filtration tube.
- (iv) The urine formed in each kidney enters in the ureter which connects the kidneys with the urinary bladder.

- (v) Urine is stored in the urinary bladder.
- (vi) The pressure of the expanded urinary bladder leads to pass out the urine through the urethra.

28. (a) **What is the law of dominance of traits? Explain with an example.**
(b) **Why are the traits acquired during the life time of an individual not inherited? Explain.**

Ans. (a) **Law of Dominance:** Mendel took pea plant and carried two contrasting characters (tall and short) and cross pollination done among them. The traits which get expressed in F_1 generation are called dominant and which are unexpressed are called recessive which reappears in F_2 generation. This is called law of dominance. Traits may be dominant or recessive.

- When Mendel crossed a tall pea plant with a dwarf pea plant, all the F_1 plants were tall.
- When the F_1 plants were self-pollinated and an F_2 progeny raised, there were tall plants and dwarf plants.
- The trait (tallness) which has appeared in the F_1 plants is called a dominant trait, while dwarfness that remained hidden in F_1 plants, but appeared in F_2 plants, is called a recessive trait.

(b) Certain experiences and traits acquired by people during their lifetime are not passed on to their next generations because these traits do not change the gene/DNA of the germ cells. For example,

- (i) Losing weight due to starvation.
- (ii) Cutting the tails of mice for a few generation can not produce tailless mice.
Such traits can only be passed on to the next generation when they alter/change the DNA of the germ cells.

29. **Draw a ray diagram in each of the following cases to show the formation of image, when the object is placed:**

- (i) **between optical centre and principal focus of a convex lens.**
- (ii) **anywhere in front of a concave lens.**
- (iii) **at 2F of a convex lens.**

State the signs and values of magnifications in the above mentioned cases (i) and (ii).

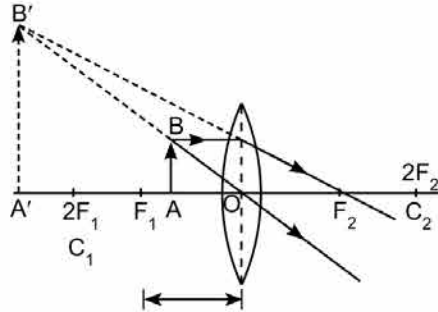
Or

An object 4.0 cm in size, is placed 25.0 cm in front of a concave mirror of focal length 15.0 cm.

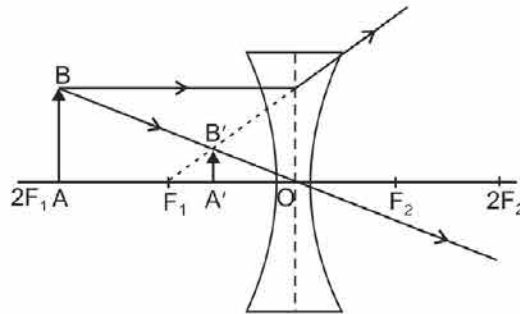
- (i) At what distance from the mirror should a screen be placed in order to obtain a sharp image?
- (ii) Find the size of the image.
- (iii) Draw a ray diagram to show the formation of image in this case.

Ans. When the object is placed:

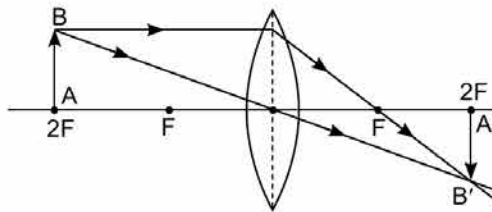
- (i) Between optical centre and principal focus of a convex lens:



- (ii) Anywhere in front of a concave lens



- (iii) AT 2F of a convex lens



(xxii)

Sign and value of Magnification will be:

Positive, in case (i) as virtual, erect and magnified image is formed. Therefore, absolute value of magnification will be greater than one.

Positive, in case (ii) as virtual, erect and diminished image is formed.

Therefore, absolute value of magnification will be less than one.

Or

(i) Given: For concave mirror,

Object distance (u) = -25 cm; Focal length (f) = -15 cm;

Height of object (h_o) = 4.0 cm

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

Substituting u and f , we get

$$\begin{aligned}\frac{1}{v} &= \frac{1}{f} - \frac{1}{u} \\ &= \frac{1}{-15} - \frac{1}{-25} \\ &= \frac{-2}{75} \\ v &= -37.5 \text{ cm}\end{aligned}$$

Therefore, the screen should be placed in front of the mirror *i.e.* on same side of the object at a distance of 37.5 cm from the mirror in order to obtain the sharp image of the object on it.

(ii) Magnification of the mirror is given by

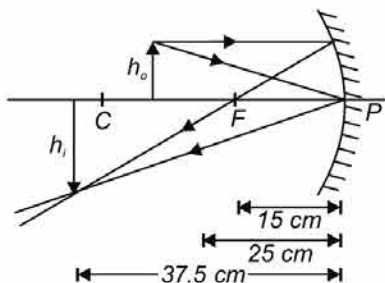
$$\begin{aligned}m &= \frac{h_i}{h_o} = -\frac{v}{u} \\ h_i &= -h_o \times \frac{v}{u} \\ &= -4 \times \frac{-37.5}{-25} \\ &= -6 \text{ cm}\end{aligned}$$

(xiii)

Therefore, size of image is 6 cm.

Since $h_i > h_o$, the image is enlarged and negative sign of v shows that image is real and inverted.

(iii) Ray diagram to show the formation of image in the case.



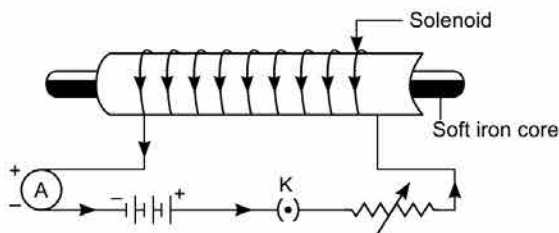
30. (a) What is an electromagnet? List any two uses.
 (b) Draw a labelled diagram to show how an electromagnet is made.
 (c) State the purpose of soft iron core used in making an electromagnet.
 (d) List two ways of increasing the strength of an electromagnet if the material of the electromagnet is fixed.

Ans. (a) **Electromagnet:** It is a device consisting of an iron or steel core that is magnetised by the strong magnetic field produced by electric current passing through the coil that surrounds it *i.e.* solenoid.

Uses of electromagnet:

- (i) It is used to separate magnetic substance from non-magnetic substance.
- (ii) It is used in electric bells, telephone receivers, microphones, loudspeakers, television etc.

(b)



- (c) (i) Soft iron core makes the magnetic field stronger because it becomes a magnet itself.
 (ii) Soft iron loses its magnetism as soon as the current stops flowing. So, it is a temporary magnet.
- (d) Two ways of increasing the strength of an electromagnet:
 (i) By increasing the current magnitude passing through the solenoid.
 (ii) By increasing the number of turns in solenoid.

Set-II (Uncommon Questions to Set-I)

SECTION-A

1. Name the functional group present in propanone.

Ans. Ketone is functional group present in propanone.

5. The compound obtained on reaction of iron with steam is/are:

- (a) Fe_2O_3 (b) Fe_3O_4
 (c) FeO (d) Fe_2O_3 and Fe_3O_4

Ans. $3\text{Fe}(s) + 4\text{H}_2\text{O}(g) \longrightarrow \text{Fe}_3\text{O}_4 + 4\text{H}_2(g)$

Or

An element 'X' reacts with O_2 to give a compound with a high melting point. This compound is also soluble in water. The element 'X' is likely to be:

- (a) iron (b) calcium
 (c) carbon (d) silicon

Ans. (b) Calcium oxide has high melting point and soluble in water.

\therefore 'X' is calcium.

11. In an ecosystem 10% of energy available for transfer from one trophic level to the next is in the form of:

- (a) heat energy (b) chemical energy
 (c) mechanical energy (d) light energy

Ans. (b) chemical energy

12. Soil fertility is determined by its ability to:

- (a) Decay organic matter (b) Hold organic matter
 (c) Hold water (d) Support life

Ans. (d) Support life

For question number 13, two statements are given – one labelled Assertion (A) and the other labelled Reason (R). Select the correct answer to this question from the codes (a), (b), (c) and (d) as given below:

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

13. **Assertion (A):** In a homologous series of alcohols, the formula for the second member is C_2H_5OH and the third member is C_3H_7OH .

Reason (R): The difference between the molecular masses of the two consecutive members of a homologous series is 144.

Ans. (c) 'A' is true but 'R' is false.

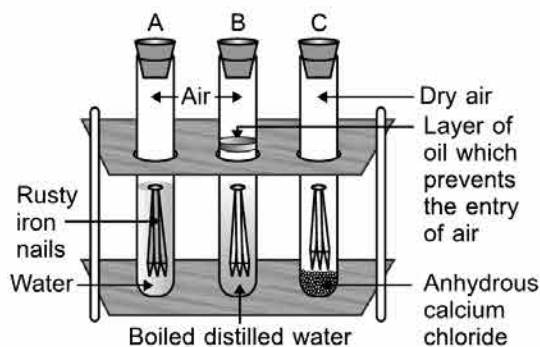
SECTION-B

15. What is 'rusting'? Describe with a labelled diagram an activity to investigate the conditions under which iron rusts.

Ans. Rusting is a process in which reddish brown coating of hydrated ferric oxide is formed at the surface of iron.

Activity:

- (i) Take three boiling tubes A, B and C.
- (ii) Pour some water in test tube A. Put iron nails in it and cork it.
- (iii) Pour boiled distilled water in another test tube B and put iron nails in it. Add 1 ml of oil over it such that oil floats over it and prevents the air from entering.
- (iv) Take some iron nails in test tube C and put some anhydrous calcium chloride in it and cork it.
- (v) Leave all the three test tubes for one day and then observe.



(xxvi)

Observation: Iron nails get rusted in test tube A because both air and water are present in it. Iron nails do not get rusted in B because there is water but no air. In C, rusting will not take place because there is neither air nor water.

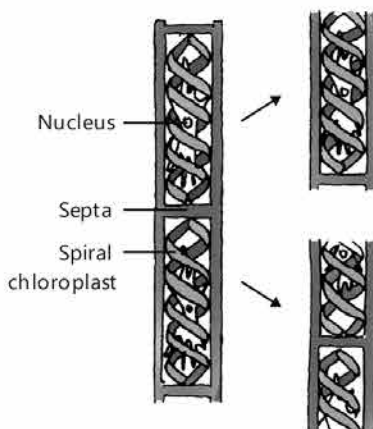
Conclusion: Iron gets rusted in the presence of air and water.

19. (a) List in tabular form two differences between binary fission and multiple fission.
 (b) What happens when a mature *Spirogyra* filament attains considerable length.

Ans. (a)

Binary fission	Multiple fission
(i) It is the division of the parent into two nearly equal sized daughter individuals. (ii) Nucleus divides into two parts with equal distribution of all the material to form two new individuals.	(i) It is the division of the parent into many small daughter individuals. (ii) Nucleus of the parent cell divides to form a number of small nuclei and develop into many new individuals.

- (b) When a filament of *Spirogyra* attains considerable length on maturation, it breaks into smaller fragments and each fragment then grows into a new plant. This mode of reproduction is called fragmentation.



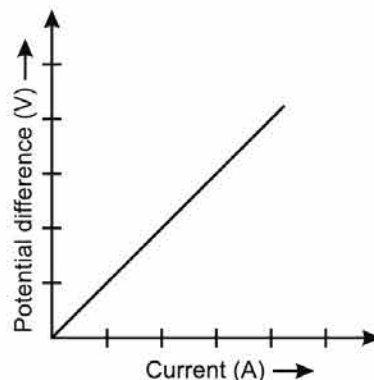
23. (a) State the relation correlating the electric current flowing in a conductor and the voltage applied across it. Also draw a graph to show this relationship.
 (b) Find the resistance of a conductor if the electric current flowing through it is 0.35 A when the potential difference across it is 1.4 V.

Ans. (a) The potential difference, V , across the ends of a given metallic wire in an electric circuit is directly proportional to the current flow through it, provided temperature remains same.

i.e., $V \propto I$
 or $\frac{V}{I} = \text{constant} = R$
 or $V = IR$

(b) Given: Potential Difference (V) = 1.4 V;
 Current (I) = 0.35 A;

Now, $V = IR$
 so, $R = \frac{V}{I} = \frac{1.4}{0.35} = 4 \text{ Ohm}$



SECTION-C

25. (a) **What is thermite process? Where is this process used? Write the balanced chemical equation for the reaction involved.**
 (b) **Where does the metal aluminium, used in the process occurs in the reactivity series of metals?**
 (c) **Name the substances that are getting oxidised and reduced in the process.**

Ans. (a) **Thermite process:** When aluminium is reacted with ferric oxide to form molten iron and Al_2O_3 , it is called thermite process.



- (b) 'Al' is at 5th position in metal activity series.
 (c) 'Al' is getting oxidised Fe_2O_3 is getting reduced.

28. (a) **What is genetics?**
 (b) **What are genes? Where are the genes located?**
 (c) **State and define three factors responsible for the rise of a new species.**

Ans. (a) **Genetics:** It is a branch of biology which deals with the study of genes, genetic variation and hereditary characters in an organism.

(b) Gene is a unit of heredity present in the chromosomes DNA that instructs the cell to produce a specific protein which is transferred from a parent to offspring and is held to determine some characteristic of the offspring.

(c) The three factors responsible for the rise of a new species are:

(i) Geographical isolation

- If a population of a species splits into two due to some geographical barrier, the gene flow between the two sub-populations decreases and each of the sub-populations becomes very different from the other; they lose the ability to reproduce with each other and become different species.

(ii) Genetic drift

- It refers to any accidental change in the frequency of certain genes especially in small populations.
- Genetic drift can accumulate different changes in the two sub-populations.
- The changes may be in the number of chromosomes, where the gametes of the two groups cannot fuse with each other; each becomes a new species.

(iii) Natural selection

- Nature selects those individuals in the population of a species, which are better adapted to survive and reproduce in the given environment.
- The frequency of certain genes changes in the population leading to changes in the characteristics and making them a new species.

Set-III (Uncommon Questions to Set-I and Set-II)

SECTION-A

2. State an important advantage of using alternating current (a.c.) over direct current (d.c.).

Ans. The advantage of using alternating current (a.c.) over Direct current (d.c.) is that the a.c can be transmitted over long distance without much loss of energy.

7. When sodium hydrogen carbonate is added to ethanoic acid a gas evolves. Consider the following statements about the gas evolved?

- (A) It turns lime water milky. (B) It is evolved with a brisk effervescence.
(C) It has a smell of burning sulphur. (D) It is also by-product of respiration.

The correct statements are:

- (a) (A) and (B) only (b) (B) and (D) only
(c) (A), (C) and (D) (d) (A), (B) and (D)

Ans. (d) CO₂ gas is evolved with brisk effervescence, is also by-product of respiration and turns lime water milky.

8. When a small amount of acid is added to water, the phenomena which occur are:

- (A) Dilution (B) Neutralisation
(C) Formation of H₃O⁺ ions (D) Salt formation

The correct statements are:

- (a) (A) and (C) (b) (B) and (D)
(c) (A) and (B) (d) (C) and (D)

Ans. (a) It is called dilution and forms H₃O⁺ ions.

9. A real image is formed by the light rays after reflection or refraction when they:
- (A) actually meet or intersect with each other.
 - (B) actually converge at a point.
 - (C) appear to meet when they are produced in the backward direction.
 - (D) appear to diverge from a point.

Which of the above statements are correct?

- (a) (A) and (D)
- (b) (B) and (D)
- (c) (A) and (B)
- (d) (B) and (C)

Ans. (c) (A) and (B)

Or

Consider the following properties of virtual images:

- (A) cannot be projected on the screen
- (B) are formed by both concave and convex lens
- (C) are always erect
- (D) are always inverted

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

Ans. (c) (A), (B) and (C)

For question number 14, two statements are given – one labelled Assertion (A) and the other labelled Reason (R). Select the correct answer to this question from the codes (a), (b), (c) and (d) as given below:

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

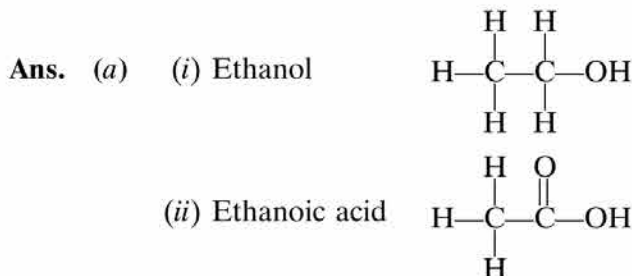
14. **Assertion (A):** A solar cooker cooks the meal due to green house effect.

Reason (R): The plane mirror is responsible for producing the green house effect.

Ans. (c) A is true but R is false.

SECTION-B

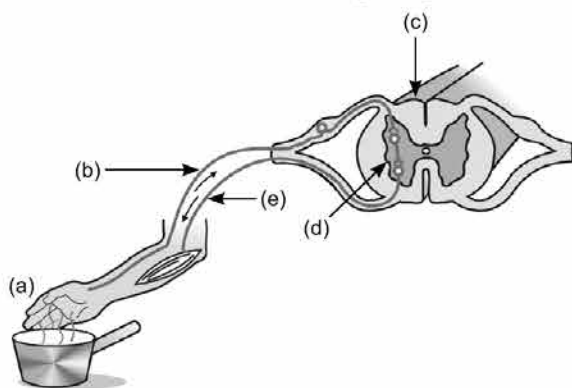
17. (a) Draw the structure for (i) ethanol, (ii) ethanoic acid.
 (b) Why is the conversion of ethanol to ethanoic acid considered an oxidation reaction? Write the oxidising agent used in the reaction involved.



- (b) Alkaline KMnO_4 oxidises ethanol to ethanoic acid. It is oxidation reaction because oxygen is being added.



18. Name the parts (a) to (e) in the following diagram.



What is the term given to the sequence of events occurring in the diagram?

Or

- (a) What is tropism?
 (b) How do auxins promote the growth of a tendril around a support?

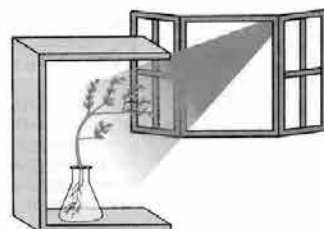
- Ans. (a) Receptors
 (b) Sensory neuron
 (c) Spinal cord (CNS)
 (d) Relay neuron
 (e) Motor neuron

Reflex arc is the term given to the sequence of events occurring in the diagram.

Or

Ans. (a) Tropism: The movement of the plant organ in the direction of an external stimulus such as light, touch, gravitational forces etc. is called tropism.

(b) When a growing plant detects light, auxin synthesises at the shoot tip to help the cells to grow longer. When light comes from one side, auxin diffuses towards the shady side of the shoot. This concentration of auxin stimulates the cells to grow longer on the side of the shoot which is away from light and the plant appears to bend towards light.



23. The near point of the eye of a person is 50 cm. Find the nature and power of the corrective lens required by the person to enable him to see clearly the objects placed at 25 cm from the eye.

Ans. Given: Object distance (u) = -25 cm; Image distance (v) = -50 cm, Power of lens (P) = ?
Using lens formula,

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

$$\Rightarrow \frac{1}{f} = \frac{1}{-50} - \frac{1}{-25}$$

$$\Rightarrow \frac{1}{f} = -\frac{1}{50} + \frac{1}{25} = \frac{1}{50}$$

or $f = +50$ cm
 $= +0.5$ m

The nature of lens is convex.

and power, $P = \frac{1}{f(\text{m})} = \frac{1}{0.5} = +2.0$ D

SECTION-C

- 27. (a) A gas is released during photosynthesis. Name the gas and also state the way by which the gas is evolved.**
(b) What are stomata? What governs the opening and closing of stomata?

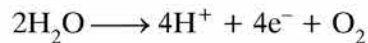
Or

- (a) Draw a diagram of human alimentary canal and label – gall bladder, pancreas, liver and small intestine on it.
- (b) Give two reasons to explain why absorption of digested food occurs mainly in the small intestine.

Ans. (a) Oxygen(O₂) gas is released during the process of photosynthesis. The following events occur during the process of photosynthesis:

- (i) Light energy is absorbed by chlorophyll.
- (ii) Light energy is converted to chemical energy and water molecules are split into hydrogen and oxygen.
- (iii) Carbon dioxide is then reduced to carbohydrate.

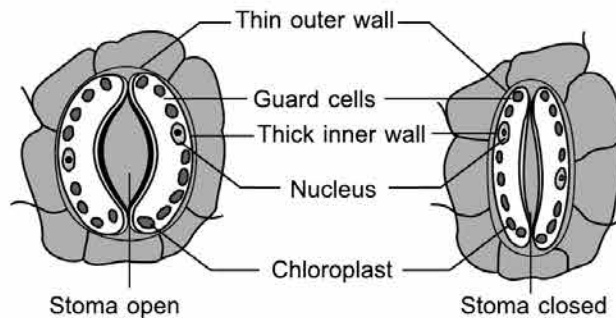
Oxygen gas is produced due to the splitting up of water molecules as follows:



This is the first phase of photosynthesis which is called light reaction. In second phase which is called dark reaction, carbon dioxide is reduced to carbohydrate in a metabolic pathway known as the Calvin cycle

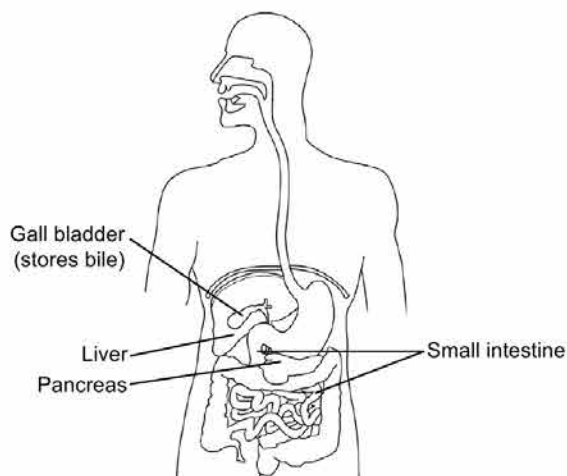
- (b) (i) **Stomata:** The tiny pores present on the epidermal. Surface of the leave are called stomata.
- (ii) The opening and closing of the pore is a function of the guard cells. The guard cells swell when water flows into them causing the stomatal pore to open. Similarly, the pore closes if the guard cells shrink. As large amount of water is lost through these stomata, the plant closes these pores when it does not require carbon dioxide for photosynthesis.

(ii)



Or

Ans. (a)



(b) The two reasons to explain why absorption of digested food occurs mainly in the small intestine are :

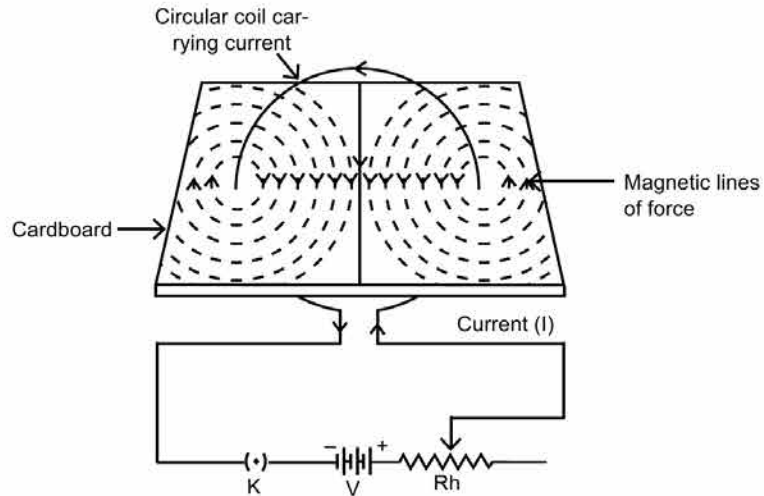
- (i) Small intestine is the site of complete digestion of carbohydrates, proteins and fats. Small intestine produces intestinal juice from the glands present in its wall. The intestinal juice helps in further digestion of food. Small intestine also obtains digestive juices from liver and pancreas. The liver produces bile juice that causes emulsification of fats and the pancreas produces pancreatic juice for digesting proteins and emulsified fats. This digested food is finally absorbed through the intestinal walls.
- (ii) Villi are finger-like projections in the small intestine. They help to increase the surface area for absorption of the digested food. Villi are richly supplied with blood vessel which help to absorb digested food into the blood stream

30. (a) Explain with the help of the pattern of magnetic field lines the distribution of magnetic field due to a current carrying a circular loop.

(b) Why is it that the magnetic field of a current carrying coil having n turns, is ' n ' times as large as that produced by a single turn (loop)?

Ans. (a) Figure shows the pattern of magnetic field lines and its distribution due to current carrying circular loop.

(i)



- (ii)
- The concentric circles at every point of a current carrying circular loop represent the magnetic field around it.
 - Magnetic field line close to the axis of loop is straight and is perpendicular to the plane of the coil.
 - Field lines keep on diverging as we move away from the centre of loop.
- (b) If the circular coil has n turns, the field produced is n times as large as that produced by a single turn. This is because the current in each circular turn has the same direction, and the field due to each turn then just adds up along the axis.

Examination Papers 2019

[Delhi (Set-I, II, III)]

Time: 3 Hours]

[M.M.: 80

General Instructions:

- (i) The question 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 questions. 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.

Note: Practical based questions will no longer be asked in the forthcoming examination.

Set-I

SECTION – ‘A’

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

Ans. Galvanometer is used to detect the presence of current in the circuit.

2. Why is biogas considered an excellent fuel?

Ans. Biogas is excellent fuel because it does not create pollution and has high calorific value.

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?

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.

Ans. • Each group has same number of valence electrons e.g. Li, Na, K have one valence electron.

- In a period, valence electrons goes on increasing from left to right e.g.

Li	Be	B	C	N	O	F	Ne
2,1	2,2	2,3	2,4	2,5	2,6	2,7	2,8
Na							
2,8,1							
K							
2,8,8,1							

It shows that basic structure of the Modern Periodic Table is based on electronic configuration.

Or

(a) It belongs to Group 14 and third period of periodic table.

(b) The element is silicon. It is metalloid. It has high melting point and semiconductor.

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

Ans. Two different ways in which glucose is oxidised to provide energy in Human body and their products are

(i) **Lack of oxygen:** Lactic acid and energy

(ii) **Presence of oxygen:** Carbon dioxide, water and energy.

- 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.**

Ans. Power of accommodation: The ability of eye lens to adjust its focal length to form the sharp image of the object at varying distances on the retina is called its power of accommodation. When we looking at nearby object, the ciliary muscles contract, it increases the curvature of eye lens, which enable us to see the nearby objects clearly.

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.**

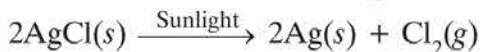
Or

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

(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. The colour of salt will change from white to grey.



It is a photochemical decomposition reaction.

Or

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



It is displacement reaction.

(b) $2\text{KI}(aq) + \text{Pb}(\text{NO}_3)_2(aq) \longrightarrow \text{PbI}_2(s) + 2\text{KNO}_3(aq)$

(Yellow ppt)

It is double displacement reaction. It is also called precipitation reaction.

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?

Ans. Acid is HCl (Hydrochloric acid), Base is NaOH (Sodium hydroxide)



It is neutral salt.

It is called rock salt because it is found in the form of rocks.

It is formed by slow evaporation of sea water.

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

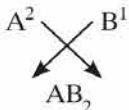
(i) Oxide of first group elements.

(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.

Ans. (i) Na_2O (sodium oxide), Li_2O (lithium oxide), K_2O (potassium oxide)

(ii) Boron trichloride (BCl_3), Aluminium chloride (AlCl_3), Gallium chloride (GaCl_3).

(iii) AB_2 is formula of the compound: 

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

Ans. Three different types of vessels with one important feature are as follows:

(i) Arteries – carry oxygenated blood

(ii) Veins – carry deoxygenated blood

(iii) Capillaries – Exchange of O_2 , CO_2 , dissolved nutrients and excretory products takes place.

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

Ans. When bright light is focus on our eye, the iris contract the pupil to allow less light to enter the eye. So the sequence of event is:

receptor cell → sensory neuron → brain → motor neuron → eye → iris → pupil.

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

Ans. Plant hormones are chemical substances produced naturally in plants and regulate one or more physiological processes when present in low concentration. Plant hormones have to coordinate growth, development and responses to the environment.

The plant hormones responsible for:

- (i) Growth of stem — Auxins and Gibberellin
- (ii) Promotion of cell division — Cytokinins
- (iii) Inhibition of growth — Abscisic acid
- (iv) Elongation of cells — Auxins

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.

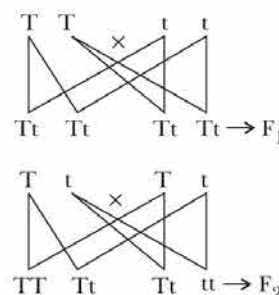
Or

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

Ans. The plant Mendel used for his experiment is Pea plant.

When Mendel crossed pure tall and short pea plants all the plants in F_1 progeny were tall plants, when Mendel crossed the tall plants of F_1 progeny the short plants reappeared and he got both tall and short plants.

The ratio of tall and short plants in F_2 progeny was 3:1

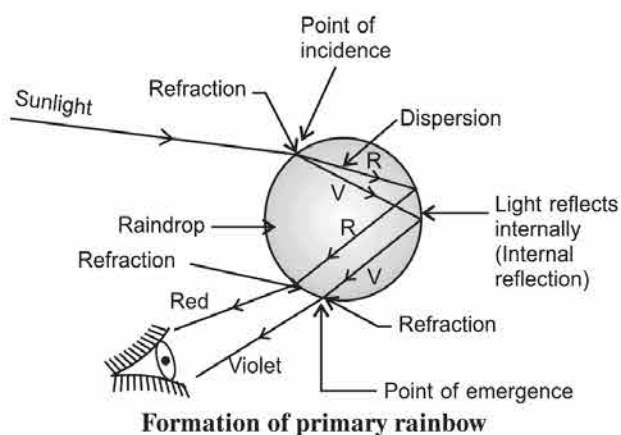


Or

Acquired traits	Inherited traits
(i) These traits are the characteristics which are developed during the lifetime of an individual.	(i) These are the characteristics transmitted from parent to the offspring.
(ii) These traits are not passed on to the next generation. e.g. Acquired trait: Less body weight due to starvation.	(ii) Inherited trait is genetically determined characteristic that distinguishes a person. e.g. Inherited trait: Colour of hair and eye.

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

Ans. Rainbow: It is an optical natural spectrum, produced by the nature in the sky, in the form of a multicoloured arc. The rainbow is formed due to the dispersion of sunlight by water droplets suspended in the atmosphere after rainfall. These water droplets act like small prisms. The Sunlight enters the water droplets. At the point of incidence, it refracts and disperses then gets reflected internally and finally gets refracted again at the point of emergence as it comes out of the rain-drop.



Therefore, due to refraction, dispersion and internal reflection of the sunlight, different colours reach the observer's eye along different paths and become distinct. It creates a rainbow in the sky.

Hence "Rainbow is an example of dispersion of sunlight."

Necessary conditions for the formation of a rainbow.

- (i) The presence of water droplets in the atmosphere, and
- (ii) The sun must be at the back of the observer, i.e. the observer must stand with his back towards the sun.

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

Or

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

Ans. Three methods used in reducing the problem of waste disposal are as follows :

- (i) By segregating biodegradable substances from non-biodegradable substances.
- (ii) By reducing, reusing and recycling non-biodegradable substances.
- (iii) By composting organic waste. The nutrient rich compost can be used as plant manure.

Or

An ecosystem is the structural and functional unit of biosphere, comprising of all the interacting organisms in an area together with the non-living constituents of the environment. Ecosystems are of two types, Natural Ecosystem and Artificial Ecosystem.

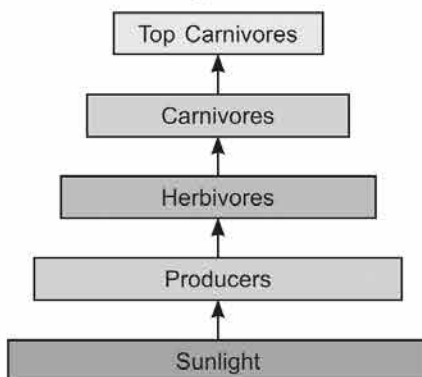


Diagram showing flow of energy in an ecosystem

Example of natural ecosystem:

Forest, desert, Pond

Example of artificial ecosystem:

Crop field, garden, aquarium.

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.

Ans. Water harvesting is the process of capturing rainwater where it falls or capturing the runoff in the local area for future use. Two advantages of water harvesting at community are:

- (i) Water harvested will percolate down and will increase the groundwater level
- (ii) Water harvested at community level can be used for drinking and irrigation purposes.

Two causes of failure of sustained availability of ground water are:

- (i) Growing population as the population increases demand for water increases resulting in depletion of ground water level.
- (ii) **Industrialisation:** With growing industries demand for water increases which results in reduction in availability of ground water.

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.

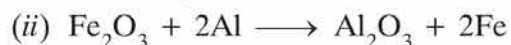
(b) Give reasons for the following:

- (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.	1. Non-metals form acidic oxides.
2. Reactive metals displace hydrogen from dilute acids.	2. Non-metals do not displace hydrogen from dilute acids.
3. Metallic oxides, when dissolved in water form bases which turn red litmus blue.	3. Non-metallic oxides, when dissolved in water form acids which turn blue litmus red.
4. Metals lose electrons to form positive ions and act as reducing agents.	4. Non-metals gain electrons to form negative ions and act as oxidising agents.

(b) (i) Metals conduct electricity because they have free electrons which can move easily and carry current.



Al is more reactive than iron, therefore, displaces Fe. It is highly exothermic reaction. Molten iron formed is used to join cracked machine part.

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.

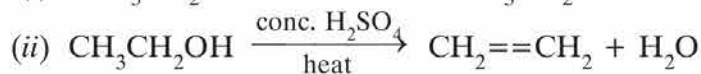
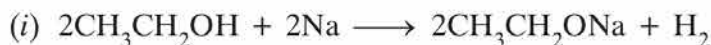
Or

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?

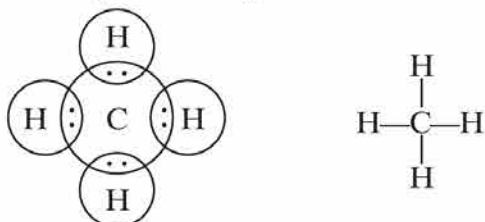
Ans. $\text{CH}_3\text{CH}_2\text{OH}$, Ethanol (IUPAC name), Ethyl alcohol (common name) is active ingredient of all alcoholic drinks.

- It is used in cough syrups and tonics.
- It is used as antiseptic.



Or

Methane (CH_4) is saturated hydrocarbon, first member of alkane series.



- (i) Such compounds are poor conductors of electricity because they do not form ions which can carry current.
- (ii) They have low melting and boiling points due to weak van der Waals' forces of attraction.

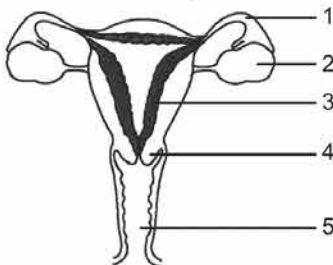
When this compound burns in air, CO_2 and water is produced.



18. Define pollination. Explain the different types of pollination. List two agents of pollination? How does suitable pollination lead to fertilization?

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 is the transfer of pollen grains from the anther of a stamen to the stigma of a carpel.

Different types of pollination:

- (i) Self-pollination: It is the transfer of pollen grains from the anther to the stigma within a flower or between two flowers of the same plant.
- (ii) Cross-pollination: It is the transfer of pollen grains from anther to the stigma of two flowers on different plants of the same species.

The two agents of pollination are wind and insect.

When the pollen falls on a suitable stigma, pollen tube grows out of the pollen grain through the style to reach the ovary. Double fertilization occurs inside each embryo sac in which two fusions, syngamy and triple fusion takes place. When one male gamete fuses with the egg contained in the embryo sac of the ovule, zygote is formed. The other male gamete fuses with the two polar nuclei and the process is called triple fusion. After fertilization the zygote divides several times to form an embryo within an ovule. The ovule then gets converted into a seed. The ovary develops and ripens to form a fruit.

Or

(a) The diagram is of Human Female Reproductive System.

1. Fallopian tube
2. Ovary
3. Uterus
4. Cervix
5. Vagina

(b) Contraception is a method used to avoid pregnancy.

Three advantages of adopting contraceptive measures are as follows:

1. It helps in avoiding unwanted pregnancy.
2. Condom helps in preventing STDs (Sexually Transmitted Diseases)
3. It helps in maintaining reproductive health in women.

19. An object is placed at a distance of 60 cm from a concave lens of focal length 30 cm.

(a) Use lens formula to find the distance of the image from the lens.

(b) List four characteristics of the image (nature, position, size, erect/inverted) formed by the lens in this case.

(c) Draw ray diagram to justify your answer of part (ii).

Ans. (a) Given: $u = -60$ cm, $f = -30$ cm

Using lens formula, $\frac{1}{f} = \frac{1}{v} - \frac{1}{u}$

we get
$$\frac{1}{-30} - \frac{1}{-60} = \frac{1}{v} - \frac{1}{-60} = \frac{1}{v} + \frac{1}{60}$$

$$\therefore \frac{1}{v} = \frac{1}{-30} - \frac{1}{60} = -\frac{3}{60} = -\frac{1}{20}$$

$$\therefore v = -20 \text{ cm}$$

(b) • Nature of image : Virtual

• Position of image : Between optical centre and focus of concave lens.

• Size of image : Smaller than the object using

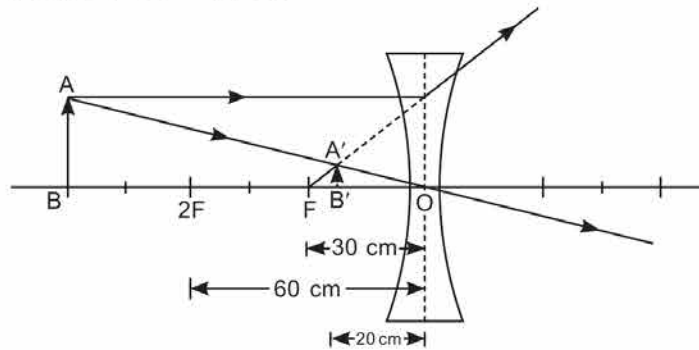
$$m = \frac{h_i}{h_o} = \frac{v}{u} \quad \left(h_i = +\frac{h_o}{3} \right)$$

$$\begin{aligned} h_i &= \frac{v}{u} \times h_o \\ &= \frac{-20}{-60} \times h_o = \frac{h_o}{3} \end{aligned}$$

So size of image is one third of the object.

- Erect/inverted : Erect image

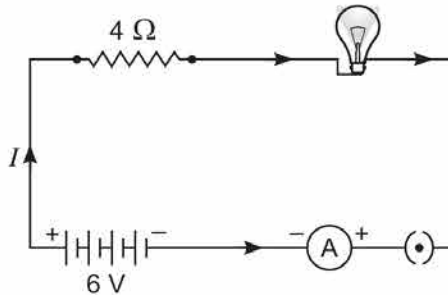
(c) Ray diagram : Scale 1 cm = 10 cm



20. (a) With the help of a suitable circuit diagram prove that the reciprocal of the equivalent resistance of a group of resistance 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.

Or

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



Calculate:

- the total resistance of the circuit,
- the current through the circuit,
- the potential difference across the (i) electric lamp and (ii) conductor, and
- power of the lamp.

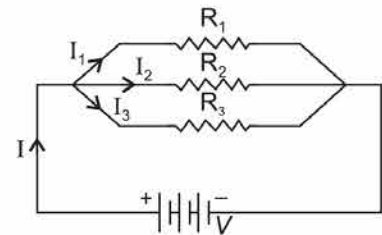
Ans. (a) Consider the parallel circuit as shown:

[Parallel circuit]

Let I_1, I_2 and I_3 be the current flow through the resistor R_1, R_2 and R_3 connected in parallel.

Using Ohm's law, current through each resistor is

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



Let their equivalent resistance be R_p then

$$V = IR_p \Rightarrow I = \frac{V}{R_p}$$

Total current through the circuit is $I = I_1 + I_2 + I_3$

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

or
$$\frac{V}{R_p} = V \left(\frac{1}{R_1} + \frac{1}{R_2} + \frac{1}{R_3} \right)$$

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

(b) Equivalent resistance in parallel combination is given by

$$\frac{1}{R_p} = \frac{1}{R_1} + \frac{1}{R_2} = \frac{1}{12} + \frac{1}{12} = \frac{1}{6}$$

$\therefore R_p = 6 \Omega$

Current drawn from the battery

$$I = \frac{V}{R_p} \quad \text{[From Ohm's law]}$$
$$= \frac{6}{6} = 1 \text{ A}$$

Or

(a) Total resistance in series combination,

$\therefore R_s = R_1 + R_2 = 4 + 20 = 24 \Omega$

(b) Current, $I = \frac{V}{R_s} = \frac{6}{24} = \frac{1}{4} \text{ A}$

$$I = 0.25 \text{ A}$$

(c) (i) Potential difference across the electric lamp,

$$V = IR_{\text{bulb}} = 0.25 \times 20 = 5 \text{ V}$$

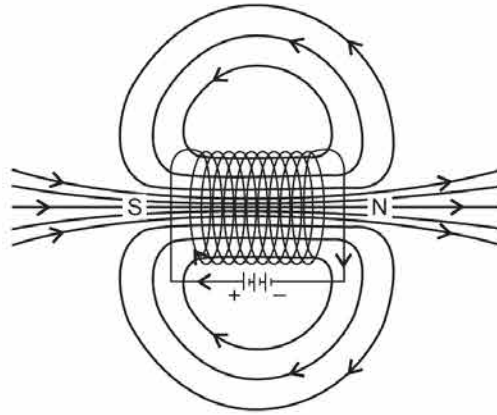
(ii) Potential difference across the conductor

$$V = IR_{\text{conductor}} = 0.25 \times 4 = 1 \text{ V.}$$

(d) Power of the lamp, $P = VI = 5 \times 0.25 = 1.25 \text{ W}$

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.

Ans. Solenoid: A coil of many circular turns of insulated copper wire wound on a cylindrical insulating body (i.e. cardboard etc.) such that its length is greater than its diameter is called solenoid.



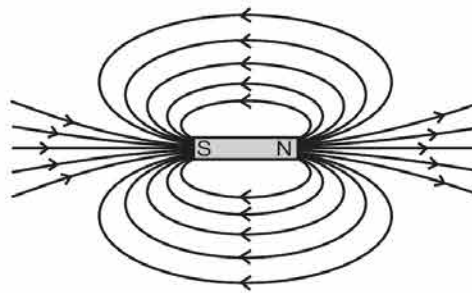
Pattern of magnetic field lines of

(i) Current carrying solenoid:

Outside the solenoid magnetic field is minimum. At the ends of solenoid, magnetic field strength is half that of inside it. So

Minimum – at point *B*; Maximum – at point *A*

(ii) A bar magnet



Two distinguish features between two fields

- (i) Polarity of solenoid can be reversed by reversing the current but polarity of bar magnet cannot be reversed.
- (ii) The magnetic field strength of current carrying solenoid can change easily but that of bar magnet cannot.
- (iii) Magnetic field outside the solenoid is weak as compared to bar magnet.

Set-II (Uncommon Questions to Set-I)

SECTION – ‘A’

1. Name and define the SI unit of current.

Ans. SI unit of electric current is ampere (A).

Ampere is the flow of electric charges through a surface at the rate of one coulomb per second, i.e. if 1 coulomb of electric charge flows through a cross-section of wire for 1 second, then it would be equal to 1 ampere.

$$\text{So, 1 ampere} = \frac{1\text{C}}{1\text{s}} \text{ i.e. } 1\text{A} = 1\text{Cs}^{-1}$$

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

Ans. Biogas contains methane as a major constituent. Its percentage is 65.

SECTION – ‘B’

3. Write the name, symbol and electronic configuration of an element X whose atomic number 11.

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.

Ans. ‘X’ is sodium. Its symbol is Na. Its electronic configuration is 2, 8, 1.

Or

(a) Na Si Cl
 23 28 35

$$\text{Atomic mass of Si} = \frac{23 + 35}{2} = \frac{58}{2} = 29$$

Although, the atomic mass of Si is nearly average of Na and Cl but it cannot be classified as Dobereiner’s triad because these elements do not resemble with each other.

(b) Be Mg Ca
 9 24 40

$$\text{Atomic mass of Mg} = \frac{40 + 9}{2} = 24.5$$

It can be classified Dobereiner’s triads because these elements resemble with each other.

4. How is O₂ and CO₂ transported in human beings?

Ans. Oxygen and carbon dioxide are transported in human beings with a gas transportation system. This system is mainly composed of following parts:

Lungs: Lungs help in breathing in oxygen-rich air and breathing out carbon dioxide-rich air.

Heart: Heart pumps deoxygenated blood to lungs for oxygenation and pumps oxygenated blood to different organs of the body.

Veins: Veins usually carry deoxygenated blood from different parts of the body to the heart. One exception is the pulmonary vein which carries oxygenated blood from lungs to heart.

Arteries: Arteries usually carry oxygenated blood from heart to different parts of the body. One exception is the pulmonary artery which carries deoxygenated blood from heart to lungs.

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

Ans. Structure of eye lens — Convex

Ciliary Muscle:

- It modifies the curvature and thereby focal length of the eye lens by contracting or relaxing itself according to the distance of the object.
- It holds the eye lens in position.

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.

Ans. Acid– H_2CO_3 , Base– NaOH



This compound is basic in nature because NaOH is strong base and H_2CO_3 is weak acid. Its pH is 8.4.

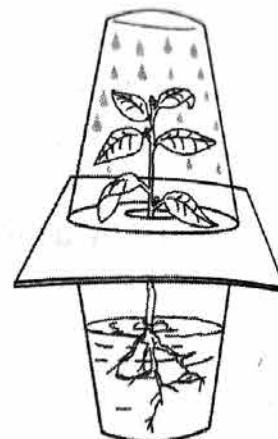
9. Define the term transpiration. Design an experiment to demonstrate this process.

Ans. Transpiration is defined as the loss of water in the form of vapour from the aerial parts of a plant.

Experiment to demonstrate transpiration

(a) **Materials required:** 2 transparent plastic glass, square cardboard, one small plant, vaseline, water and scissor.

(b) **Method:** A small hole need to be made at the centre of the cardboard. The plant stem to be passed through the hole and the gap to be sealed with vaseline. The bottom glass to be filled with water and the roots of the plant to be dipped in the water. The plant to be covered with the other glass from top. When the arrangement is kept in sunlight for 3-4 hours, droplets of water will be observed on the sides of the inverted glass which is due to transpiration.



Arrangement showing transpiration experiment

10. What is feedback mechanism of harmonic regulation? Take the example of insulin to explain this phenomenon.

Ans. Hormones need to be secreted in precise quantities. The timing and amount are regulated by feedback mechanism. Feedback mechanism is a loop in which a product feeds back to control its own production.

For example, if sugar level in blood rises, they are detected by the cells of the pancreas which respond by producing more insulin. As the blood sugar level falls, insulin feedback to lower its own production and the production stops. This process of increasing and decreasing production of insulin continues through feedback mechanism.

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

Ans. Everybody has equal rights over natural resources and also everybody should get the benefits from them. Therefore, equitable distribution of resources is essential to ensure that everybody gets their due benefit.

But many forces go against the equitable distribution of natural resources.

- The geographical factors are the most important factors which do not allow equitable distribution of natural resources.
- Economy is another factor which prevents equitable distribution of these resources.
- Human greed and corruption are other major factors which prevent equitable distribution of our resources.

SECTION – ‘D’

17. (a) Write chemical equations for the following reactions:

(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) $\text{Ca}(s) + 2\text{H}_2\text{O}(l) \longrightarrow \text{Ca}(\text{OH})_2(aq) + \text{H}_2(g)$

(ii) $\text{HgS} + \text{O}_2 \xrightarrow{\text{heat}} \text{Hg}(l) + \text{SO}_2(g)$

(iii) $3\text{MnO}_2 + 4\text{Al} \longrightarrow 3\text{Mn} + 2\text{Al}_2\text{O}_3$

(b) Alloys are homogeneous mixture of two or more metals. One of them can be non-metal also.

Properties:

(i) They are harder than pure metals.

(ii) They do not get corroded.

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

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

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

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

Ans. (a) For concave lens, $u = -30$ cm, $f = -30$ cm.

Using lens formula,

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

We have,
$$\frac{1}{-30} = \frac{1}{v} - \frac{1}{-30}$$

$$\therefore \frac{1}{v} = -\frac{1}{30} - \frac{1}{30} = -\frac{1}{15}$$

$$\Rightarrow v = -15$$
 cm

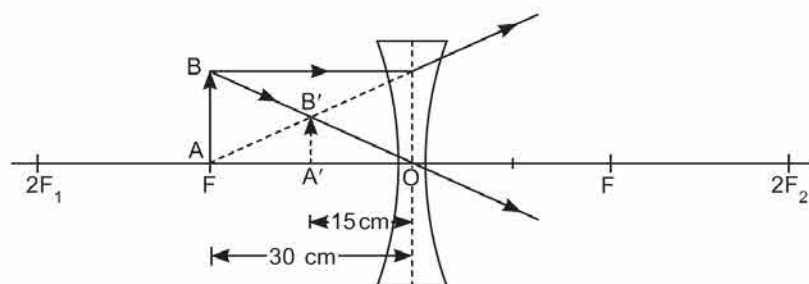
Also, magnification,

$$m = \frac{v}{u} = \frac{-15}{-30}$$

$$m = +\frac{1}{2} < 1.$$

(b) Therefore, virtual, erect, diminished (half of the size of object) image is obtained at the distance of 15 cm on the same side of the object, i.e., lies between the optical centre and focus of concave lens.

(c)



Set-III (Uncommon Questions to Set-I and Set-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.

Ans. LPG because it does not leave any residue on burning.

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

Ans. Voltmeter measure the potential difference across two points in the electrical circuit across which it is connected.

SECTION – ‘B’

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

Ans. There is no change in the image distance in the eye. The eye lens has the ability to adjust its focal length called **accommodation**. When object distance decreases ciliary muscles contract and lens becomes thick and its focal length decreases. It facilitate the near vision.

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

Ans. The different functions performed by pancreas in our body are :

- (i) Pancreas secretes pancreatic juice which contains protein digesting enzyme trypsin.
- (ii) It secretes lipase for breaking down emulsified fats.

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.**

Ans. (i) Advantages of exploiting resources with short term gain:

- It meets the immediate human needs.
- Accelerates Fast industrialization and development
- Improves the lifestyle of people.

(ii) Advantages of exploiting resources with long term gain:

- The resources last for longer period
- Benefits from resources can be obtained by future generations also.
- Minimum Environmental pollution.

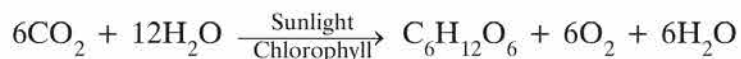
9. Nervous and hormonal systems together perform the function of control and coordination in human beings. Justify this statement with the help of an example.

Ans. The nervous system controls and coordinates all the functions in human body. The nervous system carries out its functions in close coordination with the hormonal system. Nerves of the body do not reach each and every corner of the body and hence needs assistance from the hormones to control all the parts of the body. The control from nervous system is much faster than the hormonal control. Hormonal control is mainly based on feedback mechanism and tells the body to either speed up a particular secretion or to reduce the secretion of a particular hormone as per the situation. Nervous control, on the other hand, is more of a direct control. Both nervous system and hormonal system complement each other. Thus, it can be said that nervous and hormonal systems together perform the function of control and coordination in human beings.

11. What is photosynthesis? Explain its mechanism.

Ans. Photosynthesis is a process in which green plants convert carbon dioxide and water into carbohydrates in presence of sunlight and chlorophyll. Carbohydrates are utilized to provide energy to the plant.

Mechanism



The following events occur during the process:

- (i) Light energy is absorbed by chlorophyll.
- (ii) Light energy is converted to chemical energy and water molecules are split into hydrogen and oxygen.
- (iii) Carbon dioxide is then reduced to carbohydrate.

15. Explain the following:

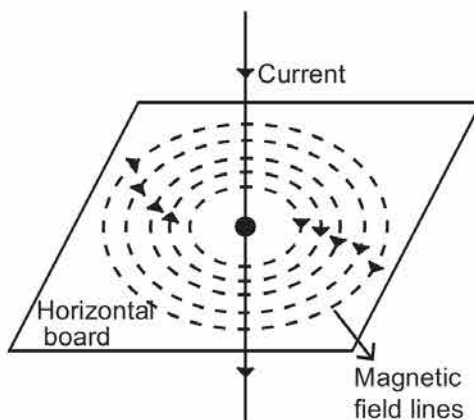
- (a) Sodium chloride is an ionic compound which does not conduct electricity in solid state where as it does conduct electricity in molten state as well as in aqueous solution.
- (b) Reactivity of aluminium decrease if it is dipped in nitric acid.
- (c) Metals like calcium and magnesium are never found in their free state in nature.

- Ans. (a) • Sodium chloride is ionic compound because it is made up of Na^+ and Cl^- ions.
(Na^+) ($:\ddot{\text{Cl}}:^-$)
- It does not conduct electricity in solid state because ions are not free to move.
 - It conducts electricity in molten state because ions are free to move.
- (b) It is due to formation of oxide layer on its surface which make, it passive (less reactive) HNO_3 is good oxidising agent.
- (c) It is because Mg and Ca are highly reactive, react with other elements to form compounds therefore, are not found in free state.

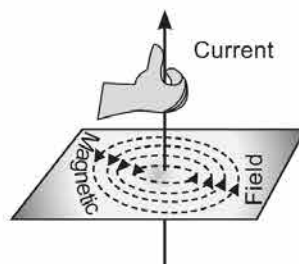
SECTION – ‘D’

17. (a) Draw magnetic field lines produced around a current carrying straight conductor passing through a cardboard. Name, state and apply the rule to mark the direction of these field lines.
- (b) 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 wire carrying constant current? Justify your answer.

Ans. (a)



Right-Hand Thumb Rule. This rule is used to find the direction of magnetic field due to a straight current carrying wire.



It states that if we hold the current carrying conductor in the right hand in such a way that the thumb is stretched along the direction of current, then the curly finger around the conductor represent the direction of magnetic field produced by it. This is known as right-hand thumb rule.

Direction of Field Lines due to current carrying straight conductor as shown in figure.

(b) Using compass needle, we can determine the strength of magnetic field at various point. If the needle is moved away from the straight wire carrying constant current, the deflection in the needle decreases. It implies that magnetic field strength decreases as the distance increases.

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

Ans. Acids are those substances which give H^+ in aqueous solution.

Bases are those substances which give OH^- in aqueous solution.

Neutralisation reaction: The reaction in which acid reacts with base to form salt and water is called neutralisation reaction, e.g.,

