CLASS X (2019-20)
SCIENCE (CODE 086)
SAMPLE PAPER-14

Time : 3 Hours **Maximum Marks : 80**

General Instructions :

(i) The question paper comprises of three sections-A, B and C. Attempt all the sections.
(ii) All questions are compulsory.
(iii) Internal choice is given in each sections.
(iv) All questions in Section A are one-mark questions comprising MCQ, VSA type and assertion-reason type questions. They are to be answered in one word or in one sentence.
(v) All questions in Section B are three-mark, short-answer type questions. These are to be answered in about 50-60 words each.
(vi) All questions in Section C are five-mark, long-answer type questions. These are to be answered in about 80-90 words each.
(vii) This question paper consists of a total of 30 questions.

Section A

1. Why does a ray of light bends when it travels from one medium to another medium? [1]

Ans : The ray of light bends due to refraction.

2. Why are iron grills painted frequently? [1]

Ans : They are painted frequently to avoid rusting.

3. Answer question numbers 3.1–3.4 on the basis of your understanding of the following paragraph and the related studied concepts.

In our country, ultrasound imaging (echography) is used to take images of the developing babies (foetus). It is considered safe for both the mother and the foetus. In this method, the doctor holds a probe and moves it across the abdomen of the mother.

Ultrasound waves which are transmitted into the abdomen are reflected from the surface of the foetus. These reflected waves are picked up by the probe and relayed to a machine that produces the image of the developing baby. In some parts of our country, ultrasound is done illegally.

3.1 What could be the reason of performing ultrasound illegally? [1]

Ans : Ultrasound scan is done to know the sex of the foetus which is prohibited by law.

3.2 "Man, and not the woman is responsible for the birth of a girl child." What is meant by this statement? [1]

Ans : Half of the male sperms have 'X' sex chromosome while the other half sperms have 'Y' sex chromosome. All the eggs of the female have 'X' chromosomes. When the sperm carrying 'X' chromosome fertilizes an egg carrying 'X' chromosome, a girl child is conceived. Hence, the male is responsible for the birth of a girl child and not the women.

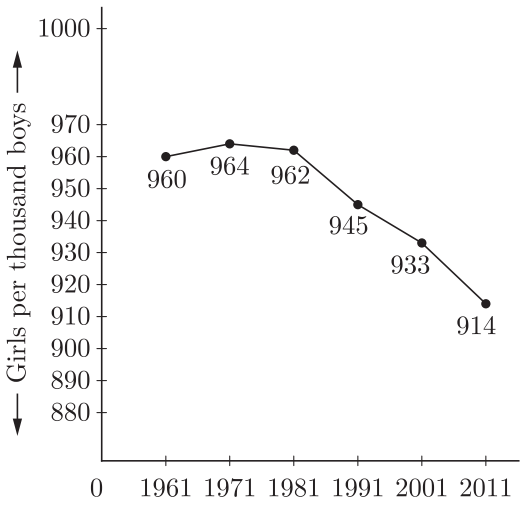
3.3 Can ultrasound examination of expecting mothers answer the following questions? Write 'Yes' or 'No'.

(a) What is the colour of the baby's eyes?
(b) Is there more than one foetus? [1]

Ans :

(a) No. Explanation: It cannot determine the colour of baby's eyes.
(b) Yes. Explanation: It can tell us if there are multiple foetus.

3.4 Based on the data shown in the graph alongside, state what could be the reason for the decline in the boys child sex ratio ? [1]



Ans : The decline in child sex ratio may be due to female foeticide.

4. Question numbers 4.1–4.4 are based on the tables given below and the related studied concepts. Analyse the tables and answer the questions that follow.

Table (i)

A	B	C	D	E	F	G
3	4	5	6	7	8	9
I	J	K	L	M	N	O
11	12	13	14	15	16	17

Table (ii)

Element	**Electronic Configuration**
A_1	2 8 1

Element	Electronic Configuration
B_1	2 8 7
C_1	2 8 8
D_1	2 4

Table (i) shows a part of a periodic table in which the elements are arranged according to their atomic numbers (the letters in figure are not the chemical symbols of the element).

Table (ii) shows the electronic configurations of four elements A, B, C and D.

4.1 Refer Table (i) and name the element which has the atomic number 7. To which group does it belong? [1]

Ans : Nitrogen and group 15

4.2 'Element I of Table (i) and element A_1 of Table (ii) are the same element. This element is the most electro-positive.' Justify this statement. [1]

Ans : The element is sodium and it is the member of group 1. Group 1 elements have high tendency of losing an electron thus they are highly electro-positive.

4.3 Refer Table (i) to answer this question.
Element J reacts with element F to form a new compound. Which of the following represents the correct symbols of J and F respectively; and the correct chemical equation? [1]
(a) J – Mg, F – O; $2Mg + O_2 \longrightarrow 2MgO$
(b) J – Na, F – Cl; $2Na + Cl_2 \longrightarrow 2NaCl$
(c) J – Mg, F – Cl; $2Mg + Cl_2 \longrightarrow 2MgCl_2$
(d) J – Na, F – O; $2Na + O_2 \longrightarrow 2NaO$

Ans : (a) J – Mg, F – O; $2Mg + O_2 \longrightarrow 2MgO$

4.4 Refer Tables (i) and (ii) to answer this question.
A salt is formed when element Al is combined with element 0. The aqueous solution of this salt produces [1]
(a) an acidic solution (b) a basic solution.
(c) a neutral solution. (d) an alkaline solution.

Ans : (c) a neutral solution.

5. Consider the following statements about the magnetic field due to a current carrying long solenoid:
A. The field lines inside the solenoid are in the form of straight lines which indicates that the magnetic field is the same at all points inside the solenoid.
B. The strong magnetic field produced inside the solenoid can be used to magnetise a piece of magnetic material like soft iron, when placed inside the coil.
C. The pattern of the magnetic field associated with the solenoid is different from the pattern of the magnetic field around a bar magnet.
D. The N-pole and the S-pole exchange positions when the direction of current through the solenoid is reversed.
The correct statements are [1]
(a) A and B only (b) C and D only
(c) B, C and D (d) A, B and D

Ans : (d) A, B and D

6. Convex lens forms a real, point sized image at focus, when the object is placed [1]
(a) at 2F (b) between F and 2F
(c) at focus (d) at infinity

Ans : (d) at infinity

or

The radius of curvature of concave mirror is 12 cm. Then, the focal length will be [1]
(a) 12 cm (b) 6 cm
(c) -24 cm (d) -6 cm

Ans : (d) -6 cm

Given, radius of curvature, $R = 12$ cm
We know that the focal length of concave mirror has negative value.

Hence, focal length, $f = \frac{-R}{2} = \frac{-12}{2} = -6$ cm

7. Ocean thermal energy is due to the [1]
(a) energy stored by waves in the ocean.
(b) temperature difference at different levels in the ocean.
(c) pressure difference at different levels in the ocean.
(d) tides arising in the ocean.

Ans : (b) temperature difference at different levels in the ocean.

8. In which of the following the image of an object placed at infinity will be highly diminished and point sized? [1]
(a) Concave mirror only
(b) Both concave and convex lens
(c) Convex mirror only
(d) Both concave mirror and convex lens

Ans : (d) Both concave mirror and convex lens

9. Our eyes form the image of an object at [1]
(a) cornea (b) pupil
(c) retina (d) optic nerve

Ans : (c) retina

or

The following one is not a primary colour
(a) Yellow (b) Red
(c) Green (d) Blue

Ans : (a) Yellow

10. Consider the following statements related to biodiversity:
A. Biodiversity refers to the different species of flora and fauna present in an area.
B. Biodiversity refers to only the flora of a given area.
C. Biodiversity is greater in a forest.
D. Biodiversity refers to the total number of individuals of a particular species living in an area.
The statement(s) that correctly describe(s) the concept of biodiversity is/are [1]
(a) A only (b) C only
(c) A and C only (d) A, B and D

Ans : (c) A and C only

11. In a hydroelectric power plant, more electrical power can be generated if water falls from a greater height because [1]

(a) its temperature increases.

(b) larger amount of potential energy is converted into kinetic energy.

(c) the electricity content of water increases with height.

(d) more water molecules dissociate into ions.

Ans : (b) larger amount of potential energy is converted into kinetic energy.

12. The focal length of the eye lens increases when eye muscles [1]

(a) contract and lens becomes thicker

(b) contract and lens becomes thinner

(c) are relaxed and lens becomes thicker

(d) are relaxed and lens becomes thinner

Ans : (d) are relaxed and lens becomes thinner

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 the 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 :** Copper articles, when exposed to moist air for a long time, react with oxygen to form a green coating. [1]

Reason : The green substance formed on the surface of copper articles is copper carbonate [$Cu_2CO_3(OH)_2$].

Ans : (d) A is false but R is true.

14. **Assertion :** The concentration of harmful chemicals is more in human beings.

Reason : Man is at the apex of the food chain.

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

or

Assertion : Green plants of the ecosystem are the transducers.

Reason : Producers trap the radiant energy of the sun and change it into chemical energy.

Ans : (a) Both A and R are true and R is the correct explanation of the assertion

Section B

15. On heating blue coloured powder of copper (II) nitrate in a boiling tube, copper oxide (black), oxygen gas and a brown gas X is formed. [3]

(a) Write a balanced chemical equation of the above reaction.

(b) Identity the brown gas X evolved.

(c) Identify the type of reaction.

(d) What could be the pH range of an aqueous solution of the gas X?

Ans :

(a) $2Cu(NO_3)_2(s) \xrightarrow{Heat} 2CuO(s) + O_2(g) + 4NO_2(g)$

(b) Brown gas X formed is nitrogen dioxide (NO_2).

(c) This is a decomposition reaction.

(d) NO_2 gas dissolves in water to form an acidic solution, because it is an oxide of a non-metal. Therefore, the pH of this solution is less than 7.

or

Write the balanced chemical equations for the following reactions:

(a) Sodium carbonate on reaction with hydrochloric acid in equal molar concentrations gives sodium chloride and sodium hydrogen-carbonate.

(b) Sodium hydrogen-carbonate on reaction with hydrochloric acid gives sodium chloride, water and liberates carbon dioxide.

(c) Copper sulphate on treatment with potassium iodide precipitates cuprous iodide (Cu_2I_2), liberates iodine gas and also forms potassium sulphate. [3]

Ans :

(a) $Na_2CO_3 + HCl \longrightarrow NaCl + NaHCO_3$

(b) $NaHCO_3 + HCl \longrightarrow NaCl + H_2O + CO_2$

(c) $2CuSO_4 + 4KI \longrightarrow Cu_2I_2 + 2K_2SO_4 + I_2$

16. An element A burns with a golden flame in air. It reacts with another element B, (atomic number 17) to give a product C. An aqueous solution of the product C on electrolysis gives a compound D and liberates hydrogen. Identify A, B, C and D. Also write down the equations for the reactions involved. [3]

Ans :

1. Element A burns with golden flame. So A is sodium (Na).
   Atomic number of B is 17. So, B is chlorine (Cl)
   A → Na; B → Cl; C → NaCl; D → NaOH
2. Chemical equations:
   $2Na + Cl_2 \longrightarrow 2NaCl$
   (A) (B) (C)

   $2NaCl(aq) + 2H_2O(l) \xrightarrow{Electrolysis} 2NaOH(aq) + Cl_2(g) + H_2(g)$
   (C) (D)

17. How and why does the chemical reactivity of the elements vary on moving down the (a) group 1 and (b) group 17 of the periodic table? Explain by giving a suitable example. [3]

Ans :

(a) The chemical reactivity of group 1 elements (metals) increases while moving down the group, as shown.

Group 1

Lithium	Li	Least reactive
Sodium	Na	↓
Potassium	K	↓
Rubidium	Rb	↓
Caesium	Cs	↓
Francium	Fr	Most reactive

Since the atomic size of the elements increases on moving down the group, the tendency of atoms to lose electron increases. Consequently, their chemical reactivity also increases.

(b) On the other hand, the chemical reactivity of non-metals decreases on moving down a group of the Periodic Table. In group 17, elements are non-metals, the chemical reactivity decreases as shown below.

Group 17

Fluorine	F	Most reactive
Chlorine	Cl	↓
Bromine	Br	
Iodine	I	Least reactive

This decrease in reactivity of non-metals is because of their atomic size which increases as we move down the group. Due to increase in the size of an atom, the nucleus of the atom has less attraction for the incoming electron. In other words, in case of non-metals, on moving down the group, the tendency of atoms to gain electrons decreases, due to which their reactivity decreases.

18. (a) Why is transpiration important for plants?
(b) Why and how does water enter continuously into the root xylem? [3]

Ans :

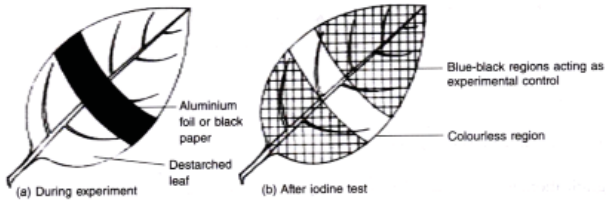
(a) Transpiration helps in absorption and upward movement of water and minerals from roots to leaves. It also helps in temperature regulation.

(b) Cells of the root are in close contact with soil and actively take up ions. The ion-concentration increases inside the root and hence osmotic pressure increases the movement of water from the soil into the root which occurs continuously.

19. How will you demonstrate that light is necessary for photosynthesis? [3]

Ans :

1. The process of photosynthesis cannot be carried out without sunlight. To show the necessity of light, a healthy potted plant is taken and destarched by being kept in the dark for about 72 hours.
2. After destarching the plant, the middle part of one of the leaves is covered with a black strip of paper as shown in figure. The potted plant is then exposed to sunlight for about 6 hours.

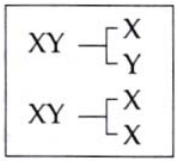


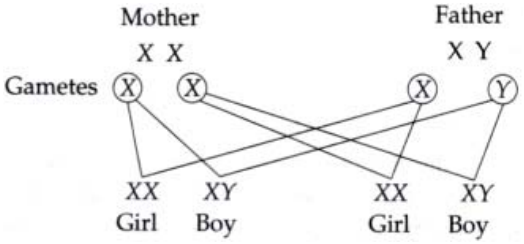
3. When this leaf was tested for the presence of starch, it was observed that the middle part of the leaf does not turn blue-black because it did not receive sunlight. The parts of the leaf exposed to sunlight turn blue-black.

20. (a) How is the sex of a newborn determined in humans?
(b) Does the genetic combination of mothers play a significant role in determining the sex of a newborn? [3]

Ans :

(a) Sex of a newborn is determined by the sex chromosomes in human beings. The human male has XY chromosomes and the female has XX chromosomes. The two chromosomes in a pair separate during gamete formation. When a sperm with X or Y chromosome fuses randomly with an egg having only X chromosome, the sex of the newborn is established. It is shown below:





(b) No, because mothers contribute one type of egg having only X chromosome. It is the father's sperms (gametes) which decide whether the newborn will be a male or a female.

or

Mention three important features of fossil which help in the study of evolution. [3]

Ans :

(a) Fossils represent modes of preservation of ancient species.

(b) Fossils help in establishing evolutionary traits among organisms and their ancestors.

(c) Fossils help in establishing the time period in which organisms lived.

21. Analyse the following observation table showing variation of image-distance (v) with object-distance (u) in case of a convex lens and answer the questions that follow, without doing any calculations:

S. No.	Object distance u (cm)	Image distance v (cm)
1.	– 60	+ 12
2.	– 30	+ 15
3.	– 20	+ 20
4.	– 15	+ 30
5.	– 12	+ 60
6.	– 9	+ 90

(a) What is the focal length of the convex lens? Give reason for your answer.

(b) For what object-distance (u) is the corresponding image-distance (v) not correct? How did you

arrive at this conclusion?

(c) Choose an appropriate scale to draw a ray diagram for the observation at S. No. 4, and find the approximate value of magnification. [3]

Ans :

(a) $f = +10$ cm

Reason: Observation at S. No. (3) indicates, $u = -20$ cm, $v = +20$ cm

Thus the object is at 2F ($2f = 20$ cm). Therefore, $f = +10$ cm

(b) Observation at S. No. (6) is not correct.

Here, the value of $u = -9$ cm, i.e. the object is in between the optical centre and principal focus of the lens (for u less than f). The image should be on the same side as the object. Hence v cannot have a +ve value.

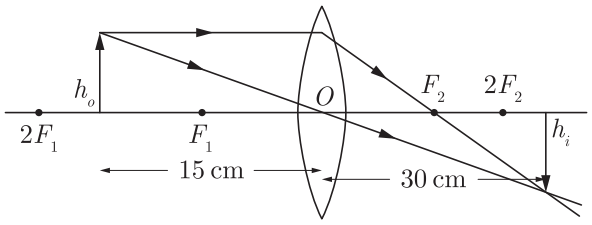
(c) **Scale:** 1 cm = 5 cm

$$h_o = 0.5 \text{ cm}$$

$$h_i = 1 \text{ cm}$$

$$m = \frac{1 \text{ cm}}{0.5 \text{ cm}} = 2$$

Ray Diagram:



or

The distance between the object and its inverted image formed by a concave mirror is 15 cm. If the magnification produced by the mirror is –2, use the mirror formula to determine the object distance, image distance and focal length of the mirror. Draw a ray diagram to illustrate the image formation in this case and also mark these distances. [3]

Ans :

Here, $v - u = 15$ cm;

$m = -2$;

$u = ?$; $v = ?$; $f = ?$

Magnification, $m = -\frac{v}{u}$

$$-2 = \frac{-v}{u}$$

$$v = 2u$$

$\because$ $v - u = 15$ cm

$$2u - u = 15 \text{ cm}$$

$$u = 15 \text{ cm}$$

$$v = 2u = (2 \times 15) \text{ cm} = 30 \text{ cm}$$

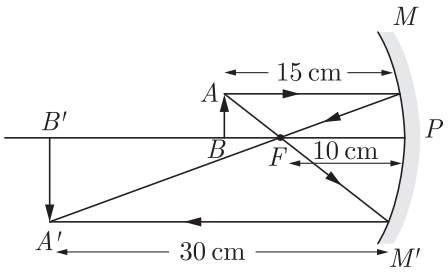
Mirror formula, $\frac{1}{f} = \frac{1}{v} + \frac{1}{u}$

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

Since the object distance is always taken as negative (New Cartesian Sign Convention), $u = -15$ cm; $v = -30$ cm

$\therefore$ $$f = \frac{-15 \text{ cm} \times -30 \text{ cm}}{-15 \text{ cm} + (-30 \text{ cm})}$$

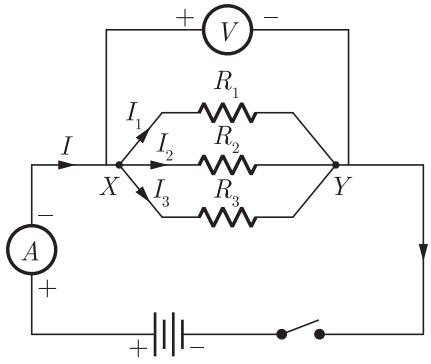
$$= -10 \text{ cm}$$



22. Three resistors R_1, R_2 and R_3 are connected in parallel and the combination is connected to a battery, an ammeter, a voltmeter and a key. Draw a suitable circuit diagram. Obtain an expression for the effective resistance of the combination of resistors in parallel. [3]

Ans :

In a parallel combination of three resistors, the potential difference across the resistors remains the same but the current through them differs. The total current of the circuit is the sum of current through all the resistors,



i.e., $$I = I_1 + I_2 + I_3 = \frac{V}{R}$$

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

$\therefore$ $$\frac{V}{R} = \frac{V}{R_1} + \frac{V}{R_2} + \frac{V}{R_3}$$

$$\frac{V}{R} = V\left[\frac{1}{R_1} + \frac{1}{R_2} + \frac{1}{R_3}\right]$$

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

23. Two identical resistors of 7 Ω each are connected to a battery of 6 V. Calculate the ratio of the powers consumed by the resulting combinations with minimum resistance and maximum resistance. [3]

Ans :

1. For minimum resistance, both the resistors will be connected in parallel.

$\therefore$ $$\frac{1}{R_p} = \frac{1}{7\,\Omega} + \frac{1}{7\,\Omega} = \frac{2}{7\,\Omega}$$

$\therefore$ $$R_p = \frac{7}{2}\Omega = 3.5\,\Omega$$

$$P_p = \frac{V^2}{R} = \frac{6 \text{ V} \times 6 \text{ V}}{3.5\,\Omega} = \frac{6 \times 6}{3.5} \text{ W}$$

2. For maximum resistance, both the resistors will be connected in series.

$\therefore \quad R_s = 7\,\Omega + 7\,\Omega = 14\,\Omega$

$$P_s = \frac{6 \times 6}{14}\,\text{W}$$

3. Ratio of the power consumed $= \frac{P_p}{P_s}$

$$= \frac{\frac{6 \times 6}{3.5}}{\frac{6 \times 6}{14}} = \frac{14\,\text{W}}{3.5\,\text{W}} = 4:1$$

24. You have been selected to speak on the topic "Ozone layer and its protection" in the school assembly on Environment Day.

(a) Why should the ozone layer be protected to save the environment?

(b) List any two ways to bring awareness amongst your fellow students that would also help in protection of the ozone layer as well as the environment. [3]

Ans :

(a) Because the ozone layer protects (shields) the Earth from harmful ultraviolet radiations of the Sun.

(b) (i) Conducting poster competitions with themes that highlight the harmful effects of ozone layer depletion.

(ii) Performing street plays that highlight the ways of environmental protection (avoiding use of products involving CFCs).

Section C

25. With the help of an example, explain the term 'neutralisation reaction'. Also give suitable examples to show the formation of acidic, basic and neutral salts. [5]

Ans :

1. **Neutralisation reaction:** A reaction between an acid and a base to produce salt and water is known as neutralisation reaction.
For example:
$\underset{\text{Acid}}{HCl} + \underset{\text{Base}}{NaOH} \longrightarrow \underset{\text{Salt}}{NaCl} + H_2O$

2. **Acidic salt:** When a neutralisation reaction takes place between a strong acid and a weak base, an aqueous solution of acidic salt is produced which has pH less than 7.
Strong acid (aq.) + Weak base (aq) $\longrightarrow$ Acidic salt (aq) + Water

$$HCl(aq) + NH_4OH(aq) \longrightarrow NH_4Cl(aq) + H_2O(l)$$

$$H_2SO_4(aq) + Ca(OH)_2(aq) \longrightarrow CaSO_4(aq) + 2H_2O(l)$$

3. **Basic salt:** When a neutralisation reaction takes place between a weak acid and a strong base, an aqueous solution of basic salt is produced which has a pH greater than 7.
Weak acid (aq) + Strong base (aq) $\longrightarrow$ Basic salt (aq) + Water (l)

$$H_2CO_3(aq) + 2NaOH(aq) \longrightarrow Na_2CO_3(aq) + 2H_2O(l)$$

4. **Neutral salt:** When a neutralisation reaction takes place between a strong acid and a strong base, an aqueous solution of neutral salt, having a pH equal to 7, is produced.
Strong acid (aq) + Strong base (aq) $\longrightarrow$ Neutral salt (aq) + Water (l)

$$HCl(aq) + NaOH(aq) \longrightarrow NaCl(aq) + H_2O(l)$$

26. (a) Explain the nature of the covalent bond using the bond formation of CH_3Cl.

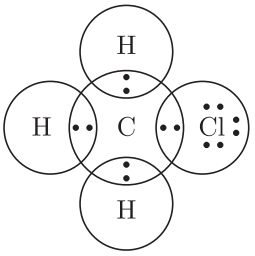
(b) Give reason:

(i) Why carbon compounds are bad conductors of electricity?

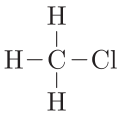
(ii) Why carbon compounds generally have low melting and boiling points? [5]

Ans :

(a) C(6) = 2, 4;
Cl(17) = 2, 8, 7;
H(1) = 1
The valence electrons take part in covalent bond formation.



or



In CH_3Cl, there are four single covalent bonds. Three covalent bonds are formed between carbon and hydrogen and one covalent bond is formed between carbon and chlorine.

(b) (i) Carbon compounds do not have positive and negative ions in their fused state or molten state. Thus, when electric current is applied, no ions migrate to the opposite poles and hence, no conduction of electric current takes place.

(ii) The molecules of carbon compounds are held by weak forces of attraction. Thus, very small amount of energy is required to break bonds between two or more molecules. Therefore, they have low melting and boiling points.

or

What is a homologous series of carbon compounds? Write its two characteristics. Giving reason select two compounds from the following which belong to the same homologous series: C_2H_2, C_2H_4, C_2H_6, C_3H_4, C_4H_5, C_6H_6 [5]

Ans :

1. **Homologous series :** A series of carbon compounds in which the successive members differ by $-CH_2$ group.

2. **Characteristics:**

(i) All members of a homologous series can be represented by the same general formula, e.g. alkane family is represented by the general formula C_nH_{2n+2}.

(ii) Any two consecutive members of a homologous series differ by $-CH_2$ group.

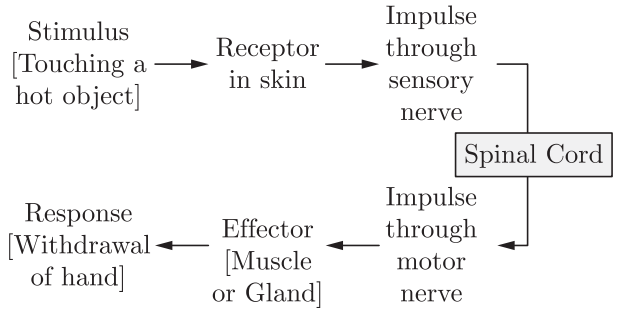
(iii) The difference in the molecular mass of any two consecutive members is 14 u.
(iv) All the compounds of a homologous series show similar chemical properties.
(v) All the members of a homologous series can be prepared by a similar method of preparation.

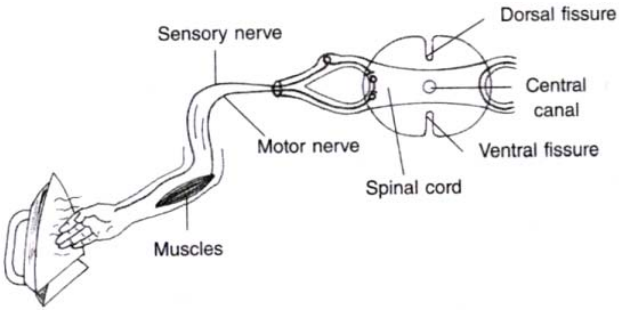
3. C_2H_2 and C_3H_4 belong to the same homologous series because both are alkynes having same general formula C_nH_{2n-2}.

27. What are reflex actions? Give two examples. Explain a reflex arc. [5]

Ans :

1. **Reflex action:** A sudden, automatic and involuntary response to any stimulus. It is a mechanical action and is protective in nature.
2. Examples of reflex action:
   (a) Sudden withdrawal of hand on touching a hot object.
   (b) Sudden forward movement of leg with a jerk when we step on a thumb pin lying on the floor.
   (c) Blinking of eyes, coughing and sneezing.
   (d) Secretion of saliva on seeing a favourite dish.
3. When reflex action takes place, a particular pathway is followed by the nerve impulse which is termed as "reflex arc" [Fig. (A) and Fig. (B)].





or

(a) (i) State the function of plant hormones. Name a plant hormone which is essential for cell division.
(ii) Name the plant hormone which is involved in phototropism. Explain its role.
(b) (i) Identify the glands that secrete insulin and thyroxine.
(ii) Explain with an example how the timing and the amount of hormones secreted are regulated in the human body. [5]

Ans :

(a) (i) Plants do not have electrical impulses but use chemical compounds to control and coordinate. This is performed in plants by phytohormones or plant hormones. Cytokinin is essential for cell division.
(ii) Auxin is involved in phototropism. It helps in bending the shoot towards the source of light which occurs due to the diffusion of auxin (synthesised at the shoot tip) towards the shady side of the shoot which stimulates the cells to grow abundantly.
(b) (i) • Pancreas— Insulin;
• Thyroid— Thyroxine
(ii) The timings and amounts of hormones released are regulated by feedback mechanisms. For example, glucose level in the blood is maintained at a constant 0.1%. The blood glucose level may be maintained constantly by either of the following feedback mechanisms:
• High glucose level in the blood induces the pancreatic cells to produce more insulin which converts glucose to glycogen.
• Low glucose level in the blood does not induce the pancreatic cells to produce insulin so that lesser or conversion of glucose to glycogen may occur.

28. Define vegetative propagation giving suitable examples. List five advantages of vegetative propagation. [5]

Ans :

1. **Vegetative propagation:** A method of reproduction followed in flowering plants such as potato, rose and, in a number of ornamental plants. In this process, new individuals or daughter organisms are produced from the vegetative parts of the plant body such as the stems, roots and leaves under appropriate conditions. The buds present on the stem, root or leaves give rise to new plants. Banana, orange and jasmine can reproduce vegetatively.
2. **Advantages of vegetative propagation:**
   (i) Plants produced by vegetative propagation can bear flowers and fruits earlier than those produced from seeds.
   (ii) Plants which produce non-viable seeds or a few seeds or have lost the ability to produce seeds can be made to reproduce vegetatively.
   (iii) Plants produced by vegetative propagation are genetically similar to the parent plant and show all the characteristics of the parent.
   (iv) Healthy, disease-free plants are produced by vegetative propagation.
   (v) Chances of survival of plants are higher under proper care.

29. (a) Name the defect of vision which is also called old age hypermetropia. What is its cause and how is it corrected?
(b) A person can see objects if they are placed beyond 1 m. What kind of lens would he require to read a book at a distance of 25 cm? Calculate the power of the lens used. [5]

Ans :

(a) (i) **Presbyopia:** For most people, due to ageing, the near point (25 cm) recedes away and they have difficulty in viewing nearby objects.

This occurs due to the weakening of ciliary muscles.

(ii) Sometimes, due to the weakening of ciliary muscles people also suffer from both myopia and hypermetropia. In such cases, they use a bifocal lens which is made up of a concave lens at the upper portion and a convex lens in the lower portion to facilitate distant vision and near vision respectively.

(b) (i) The person is suffering from long sightedness. He would require a convex lens to correct this defect.

(ii) Here, $u = -25$ cm; $v = -1$ m $= -100$ cm; $f = ?$
Substituting these values in the lens formula,

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

we have $$\frac{1}{f} = \frac{1}{-100\text{ cm}} - \frac{1}{-25\text{ cm}}$$

$$= -\frac{1}{100\text{ cm}} + \frac{1}{25\text{ cm}} = \frac{3}{100\text{ cm}}$$

$\therefore$ $$f = \frac{100\text{ cm}}{3}$$

Power of the lens, $$P = \frac{100}{f(\text{in cm})} = \frac{100}{\frac{100\text{ cm}}{3}}$$

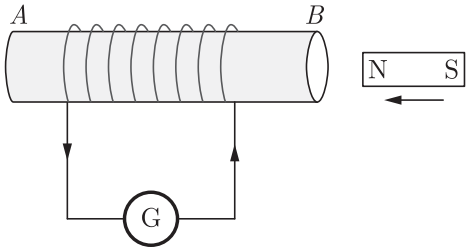
$$= \frac{100}{100} \times 3\text{D}$$

$\therefore$ $$P = +3\text{D}$$

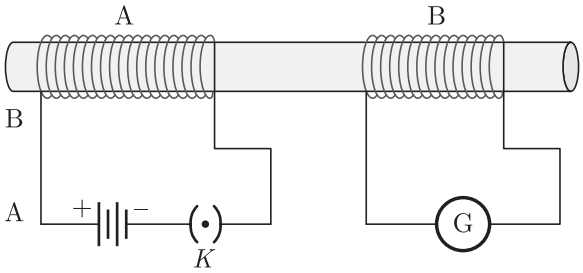
30. Explain different ways to induce current in a coil. [5]

Ans :

(a) Inducing current in a coil by relative motion of magnet:
Take a coil of insulated copper wire and connect its two ends with a galvanometer. Take a strong bar magnet and bring its north pole towards the coil, near end B. The galvanometer will show a deflection. The galvanometer will again show a deflection, when the magnet is taken away from the coil, in the opposite direction. This activity shows that a current is induced in the coil due to the motion of magnet near it.



(b) Inducing current in a coil by varying current in the primary coil Take two different coils of copper wire having many turns. Insert them over a non-conducting cylindrical roll as shown.



Connect coil A with a battery and coil B with a galvanometer. When the key is plugged in, the current passes through coil A and current is induced in coil B. When the key is disconnected, the galvanometer will again show deflection due to induction of current but in opposite direction. This induction is due to the variation of current in the first coil.

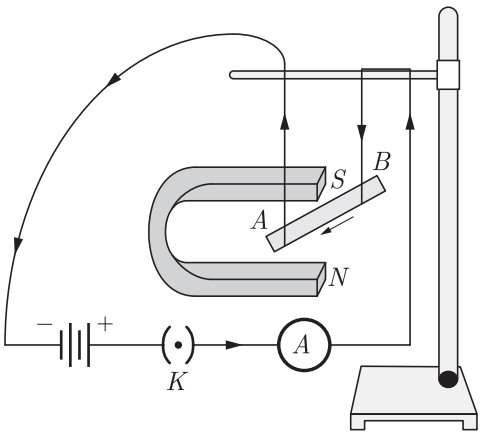
or

Describe an activity to show that a current carrying conductor experiences a force perpendicular to its length and the external magnetic field. How does Fleming's left-hand rule help us to find the direction of the force acting on the current carrying conductor? [5]

Ans :

Activity:

1. Take a small aluminium rod AB of about 5 cm and suspend it horizontally from a stand with connecting wires as shown.
2. Place a horse-shoe magnet in such a way that the north pole of the magnet lies vertically below and south pole of the magnet lies vertically above the aluminium rod. The rod AB hangs between the two pole pieces. Length of the rod should be perpendicular to the direction of magnetic field between the two poles.



3. Now connect the rod AB in series with a battery, a key and a rheostat and allow the current to pass through the rod from B to A. You will find that the rod gets displaced instantaneously towards the left.
4. Now reverse the direction of the current flowing through the rod by changing the polarity of the battery. This time the rod gets displaced towards right, indicating that the force is now acting in the opposite direction.

In this activity, we observe that the direction of force acting on the rod AB is perpendicular to both the direction of current and that of the magnetic field.