

**Class X**  
**(CBSE 2019)**  
**Science**  
**Delhi (Set-2)**

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**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.
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**Question 1**

Name and define the SI unit of current.

**SOLUTION:**

The SI unit of current is ampere. One ampere is defined as the current produced at a point through which, 1 Coulomb of charge passes in 1 second or flow of one coulomb of charge in one second through a point.

**Question 2**

Write the name of the main constituent of Biogas. Also, state its percentage.

**SOLUTION:**

The main constituents of biogas are Methane and Carbon dioxide and their percentage is as follows:

1) Methane is 75%

2) Carbon Dioxide is 23%

Other gases are approximately 2%

### Question 3

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

### SOLUTION:

The element X with atomic number 11 is Sodium with symbol Na. Electronic configuration of the element is 2,8,1.

**OR**

According to Dobereiner's triad, the atomic mass of the second element is nearly equal to the average of the atomic masses of the first and the third elements provided the three elements are arranged in the increasing order of their atomic masses.

(a) Na, Si, Cl

Atomic mass of Na-23, Si-28, Cl-35

Average of atomic masses of Na and Cl  $\frac{23+35}{2} = 29$ , which is nearly equal to the atomic mass of Si i.e. 28.

Thus, it can be considered as Dobereiner's triad.

(b) Be, Mg, Ca

Atomic mass of Be-9, Mg-24, Ca-40

Average of atomic masses of Be and Ca  $\frac{9+40}{2} = 24.5$  which is nearly equal to the atomic mass of Mg i.e. 24.

Thus, it can be considered as Dobereiner's triad.

### Question 4

How is O<sub>2</sub> and CO<sub>2</sub> transported in human beings?

**SOLUTION:**

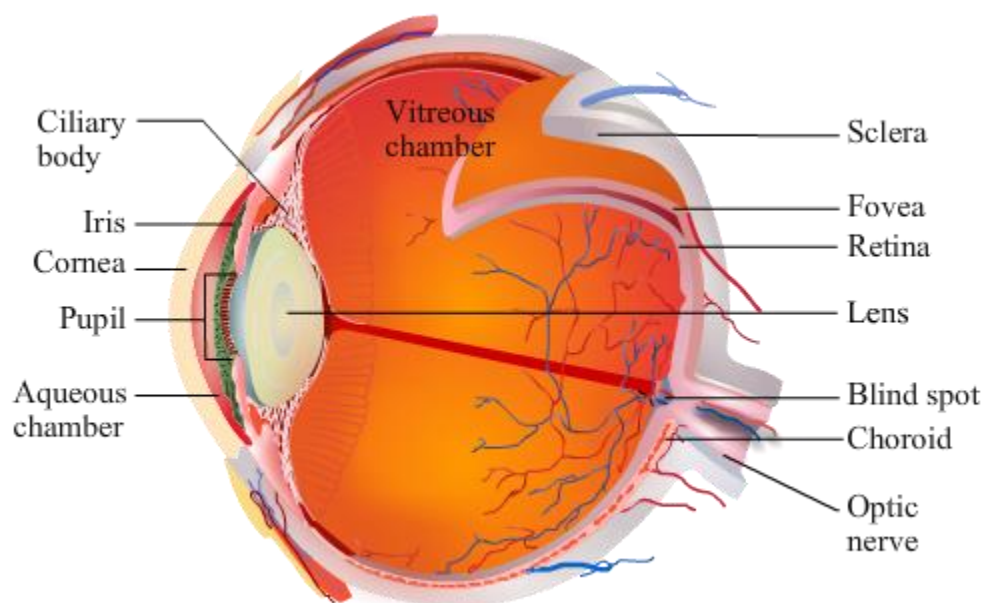
Inhaled air is rich in oxygen and is carried to the lungs. The diffusion of oxygen to the blood occurs in the capillaries, in alveoli, where the oxygen combines with the haemoglobin to form oxyhaemoglobin. This oxygen-rich blood is taken to the heart, for distribution, via the pulmonary vein. The carbon dioxide moves from the tissues to the plasma and red blood cells which are carried to capillaries in alveoli via the pulmonary artery. Carbon dioxide diffuses out from the capillaries in alveoli. The carbon dioxide rich air is at last expelled from the body during exhalation while breathing.

**Question 5**

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

**SOLUTION:**

The eye lens being convex in nature converges the light rays incident on it. Hence, it focuses the light falling on it on a thin layer of nerve cells called the retina. Two Ciliary muscles hold the lens within the eye-ball and it relaxes and tightens to change the focal length of the eye lens to get the clear image on the retina.

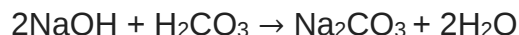


**Question 6**

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.

**SOLUTION:**

Sodium hydroxide(base) and hydrogen carbonate(acid) combine to form sodium hydrogen carbonate.



Sodium hydrogen carbonate is a basic salt because NaOH is a strong base and  $\text{H}_2\text{CO}_3$  is a weak acid.

pH value of sodium hydrogen carbonate is 8.27

### Question 7

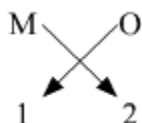
Based on the group valency of elements write the molecular formula of the following compounds giving justification for each:

- (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.

### SOLUTION:

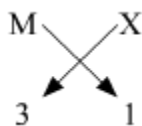
(i) Oxides of the first group elements have the common formula of  $\text{M}_2\text{O}$ .

Example-  $\text{Na}_2\text{O}$ ,  $\text{K}_2\text{O}$ . This is because, the first group elements have a common valency of 1, and the valency of Oxygen is 2 so, to satisfy the combining capacity of Oxygen two 1st group metals are required.



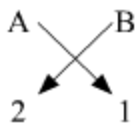
(ii) Halides of group 13 elements have a common formula of  $\text{MX}_3$ , where M-metal and X- halogen element.

Example-  $\text{AlCl}_3$ ,  $\text{BF}_3$ . This is because the valency of group 13 elements is 3 and that of halogens is 1 so, to satisfy the combining capacity of aluminum or other group 13th elements three of halogens are required in the molecular formula.



(iii) The general formula for those kinds of compounds would be  $\text{AB}_2$ .

Example-  $\text{MgCl}_2$ ,  $\text{CaCl}_2$ . This is because the valency of group 2 elements is 2 and that of group 17th elements is 1 so to satisfy the combining capacity of group 2 elements two of group 17 elements are required in the molecular formula.



### Question 8

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 for the reactions.

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

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

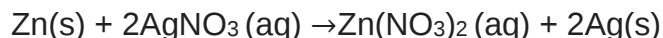
### SOLUTION:

When 2 g of silver chloride, AgCl, is kept in sunlight then AgCl breaks down into Ag and Cl<sub>2</sub>. The color of the silver chloride turns to grey.

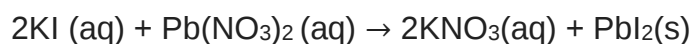
**The following change can be represented by the chemical reactions as:**

$2\text{AgCl(s)} \xrightarrow{\text{sunlight}} 2\text{Ag(s)} + \text{Cl}_2\text{(g)}$  This type of reaction is an example of a photochemical decomposition reaction.

**(a)** The given reaction is a displacement reaction in which more reactive zinc will displace less reactive silver from silver nitrate solution.



**(b)** The given reaction is a double displacement reaction.



### Question 9

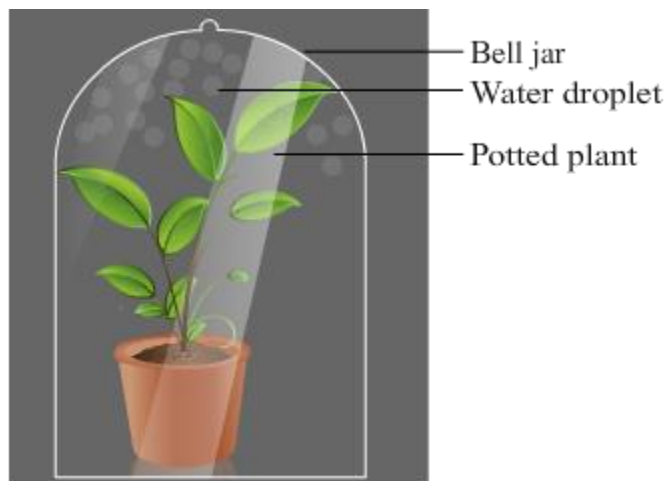
Define the term transpiration. Design an experiment to demonstrate this process.

### SOLUTION:

Loss of water vapour through the stomatal openings of the leaves of a plant is termed as transpiration.

**Following experiment can be performed to demonstrate transpiration in a plant:**

- 1) Place a healthy growing plant on a horizontal and plane slab in the sun.
- 2) Place a glass bell jar over the potted plant and seal its end to the slab by applying vaseline at its edges.
- 3) Allow the set-up to remain in the sun for some time.
- 4) Observe the presence of water droplets on the inner surface of the glass bell jar.
- 5) This collection of water droplets is indicative of transpiration.



Experiment of transpiration of plant

### Question 10

What is feedback mechanism of hormonal regulation. Take the example of insulin to explain this phenomenon.

### SOLUTION:

The endocrine glands secrete hormones depending upon the need of the organism. The level of hormones secreted should be in an accurate amount. The regulation of the quantity of the hormones and the timing of its release are controlled by feedback mechanisms.

There are two types of feedback mechanisms—positive and negative feedback.

**Positive feedback:** In this mechanism, the response accelerates after the feedback. The effect is further intensified in the same direction. It helps in speeding up the process occurring in various body systems. It is the opposite of negative feedback.

**Negative feedback:** In this mechanism, the information given by the feedback causes a reverse response. It occurs when the system needs to slow down or completely stop a process.

For example, when we consume a carbohydrate-rich diet, it is digested into glucose. The glucose is then absorbed by the blood. This results in the increase of blood sugar level and leads to the stimulation of the pancreas to secrete insulin. Insulin stimulates the target cells to take up the extra glucose from the blood. This glucose is either used during respiration or stored as glycogen. Thus, the level of insulin is reduced as pancreas receive negative feedback.

### Question 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

### SOLUTION:

In plants, growth, development, and response to the environment are controlled and coordinated by a special class of chemical substances known as phytohormones. They are naturally occurring organic substances which are synthesized in minute quantities. These hormones are produced in one part of the plant body and are translocated to other parts. For example, a hormone produced in the roots is translocated to other parts where they are required.

- (i) Gibberellins
- (ii) Cytokinins
- (iii) Absciscic acid
- (iv) Auxins

### Question 12

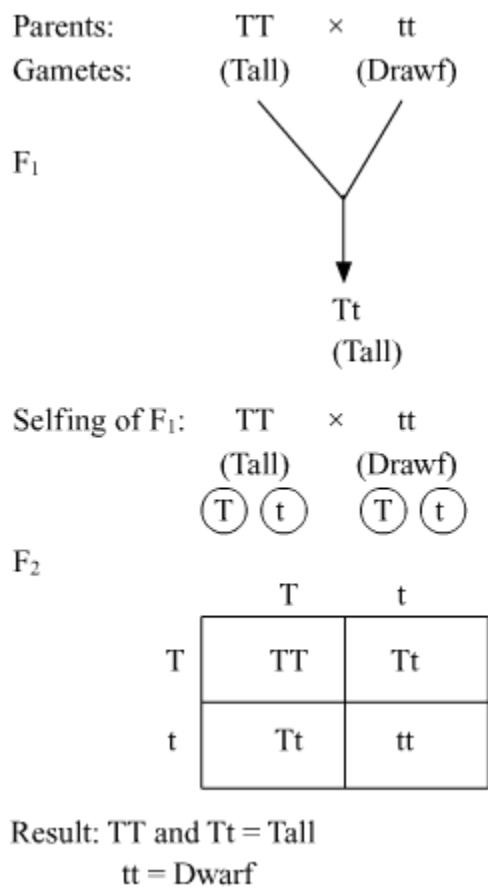
Name the plant Mendel used for his experiment. What type of progeny was obtained by Mendel in  $F_1$  and  $F_2$  generations when he crossed the tall and short plants? Write the ratio he obtained in  $F_2$  generation plants.

OR

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

### SOLUTION:

Mendel used pea plant (*Pisum sativum*) for his experiments. When Mendel crossed tall and short plants, the progeny obtained in F<sub>1</sub> generation were tall. When the F<sub>1</sub> plants were selfed, the F<sub>2</sub> generation showed three tall and one dwarf plant. The genotypic ratio of F<sub>2</sub> generation is 1:2:1 (TT : Tt : Tt : tt) and the phenotypic ratio is 3:1 (Tall: Dwarf).



OR

Differences between Acquired Traits and Inherited Traits

| Acquired Traits                  | Inherited Traits                 |
|----------------------------------|----------------------------------|
| i. These are somatic variations. | i. These are genetic variations. |

|                                                                                                                                             |                                                                                             |
|---------------------------------------------------------------------------------------------------------------------------------------------|---------------------------------------------------------------------------------------------|
| <b>ii.</b> Acquired traits develop due to the effects of environmental factors, use and disguise of organs and special (conscious) efforts. | <b>ii.</b> Inherited traits develop due to a reshuffling of genetic material and mutations. |
| <b>iii.</b> These traits develop throughout the lifetime of an individual.                                                                  | <b>iii.</b> These traits are transferred (inherited) by the parents to their offspring.     |
| <b>iv.</b> Example-Learning of dance, music, etc. and muscular body of a wrestler.                                                          | <b>iv.</b> Example-Attached or free earlobe and curly hair.                                 |

### Question 13

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

#### SOLUTION:

Natural resources, like water, forest among others are resources that are needed by all organisms. They have biological as well as ecological importance in any ecosystem. Ecological services like oxygen production, food production are a few to name. Hence, they should be equally distributed for healthy sustenance of organisms and ecosystems.

**There are certain forces that disrupt the equal distribution of such:**

- Geographical limitations- While the equatorial regions are rich in natural resources, the regions near the poles are not.
- Human exploitation- Humans have and are consuming natural resources at an unprecedented rate, degrading their availability in certain regions.
- Selfish attitude- Natural resources also suffer at the hand of rich and powerful as they use the resources to their advantage.

### Question 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.

#### SOLUTION:

The three methods we can utilise for reducing the problem of waste disposal are:

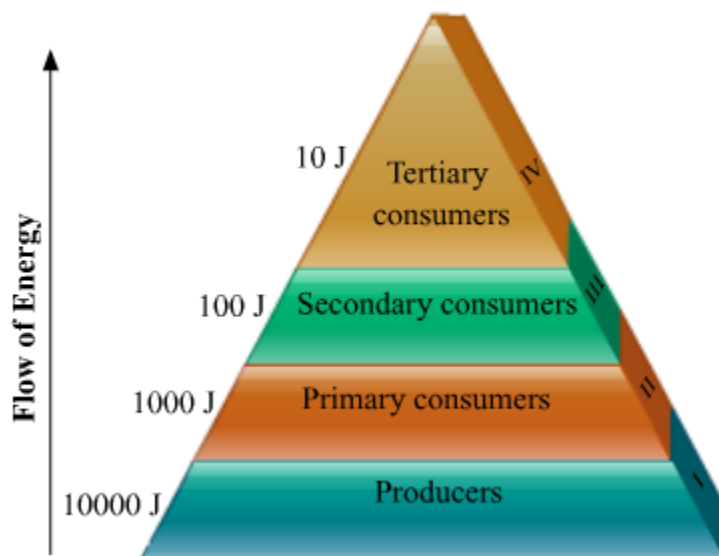
Segregation of waste into biodegradable and non-biodegradable

Following the principle of 3R- reduce, reuse and recycle

Converting biodegradable waste into useful commodities like energy from biogas, using the compost as fertiliser

**OR**

Ecosystem refers to the living and non-living components in an area and the interactions between them. Energy flows across the trophic levels as shown in the diagram below, following the ten percent law. Only ten percent of the energy available to a trophic level is passed on to the next trophic level. The remaining is dissipated away.



Assuming **10000 J** is the energy available to the producers, then

**1000 J** will be available to the primary consumers,

**100 J** will be available to secondary consumers and

**10 J** will be available to tertiary consumers.

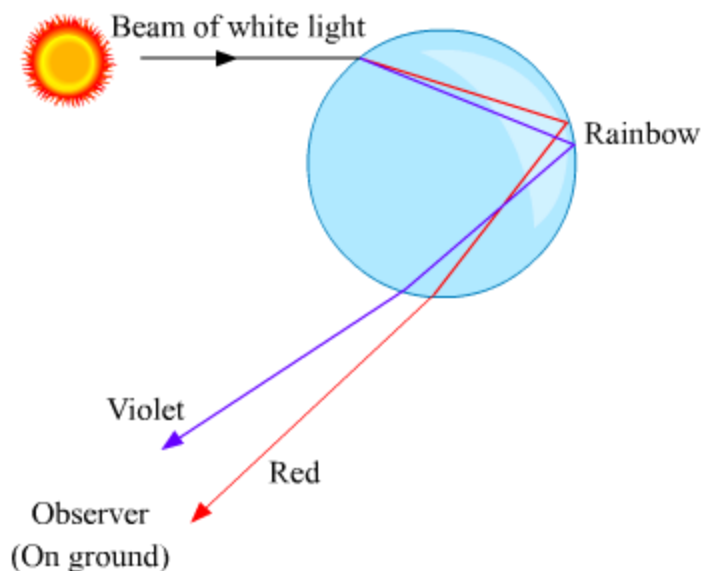
### Question 15

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

### SOLUTION:

The rainbow is a natural phenomenon in which white sunlight splits into beautiful colours by water droplets, which remain suspended in air after the rain.

**Formation of a rainbow:**



### Question 16

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?

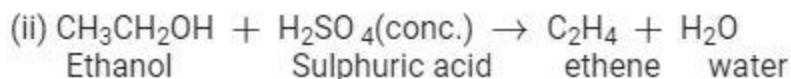
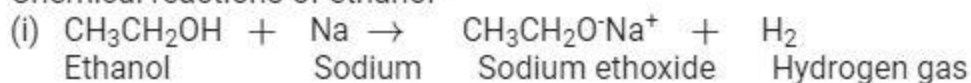
### SOLUTION:

Name of the compound which is the active ingredient of all alcoholic drinks is Ethanol, and its chemical formula is  $\text{CH}_3\text{CH}_2\text{OH}$ .

**Uses-** (i) Ethanol is used in medical wipes/swabs and antibacterial hand sanitizers.

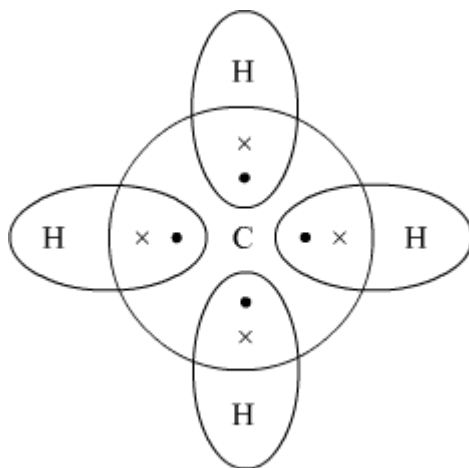
(ii) Ethanol is also used in body lotions as preservatives and stabilizer of its ingredients.

Chemical reactions of ethanol-



OR

Methane is a colourless, odourless and highly flammable gas which is the main component of natural gas. It is also called as marsh gas as it is produced when vegetation decomposes naturally in any swampy or marshlands.



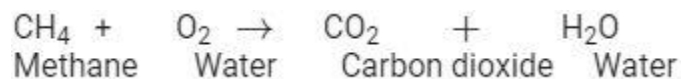
**Electron Dot structure of methane is:**

The type of bonds present in methane are all covalent bonds between four hydrogen atoms and the single carbon atom at the center of the molecule.

**(i)** Methane is a poor conductor of electricity because in methane all bonds are covalent bonds and therefore no free electrons are present in the molecule that can help in the conduction of electricity.

**(ii)** Covalent compounds have low intermolecular forces of attraction between the molecules and thus show low melting and boiling points. Since, methane is also a covalent compound thus methane has very low melting and low boiling point.

When methane is burned in the presence of Oxygen it forms Carbon dioxide gas and water as a product of the reaction.



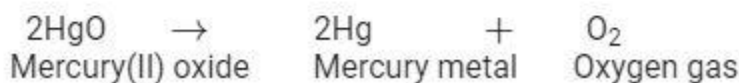
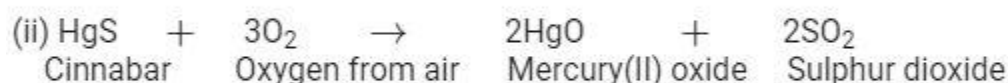
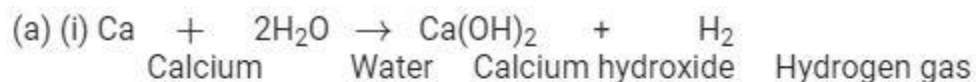
### Question 17

**(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.

**SOLUTION:**



In the above reaction when cinnabar is heated in the presence of oxygen, it is reduced to produce pure mercury metal



(b) When a metal is mixed with another element, which may be a metal or a non-metal such that a new substance which is of a homogeneous composition obtained, the substance obtained is called an alloy.

**Properties of alloys:**

- (i) Alloys are stronger than the metals from which they are made.
- (ii) Alloys are more resistant to corrosion.

**Question 18**

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

- (i) Use lens formula to determine the distance of the image from the lens.
- (ii) List four characteristics of the image (nature, position, size, erect/inverted) in this case.
- (iii) Draw a labelled diagram to justify your answer of part (ii)

**SOLUTION:**

(i) Object distance,  $u = -30$  cm

Focal length,  $f = -30$  cm

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

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

$$\Rightarrow v = \frac{uf}{u+f} = \frac{(-30)(-30)}{-30-30} = -15 \text{ cm}$$

**(ii) Characteristics of the image:**

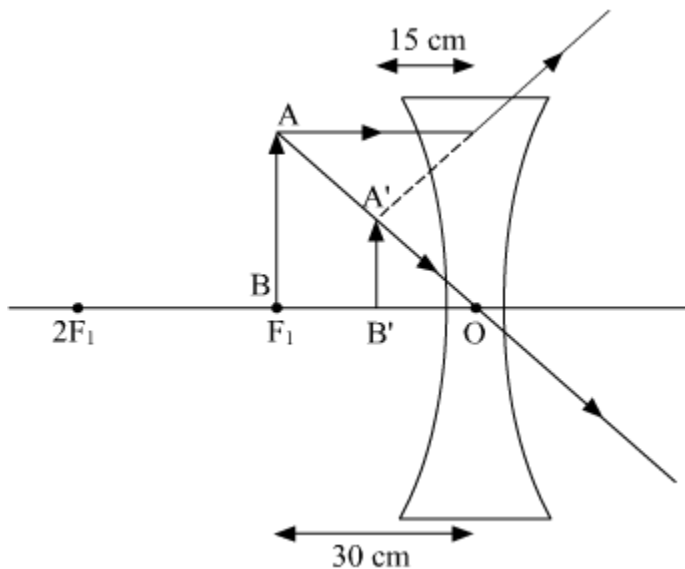
**Nature:** virtual

**Position:** 15 cm from the lens on the same side as the object

Size of the image formed is diminished

Image formed is erect

**(iii) Ray diagram:**



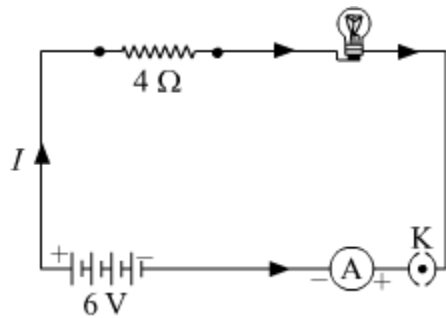
**Question 19**

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

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

**OR**

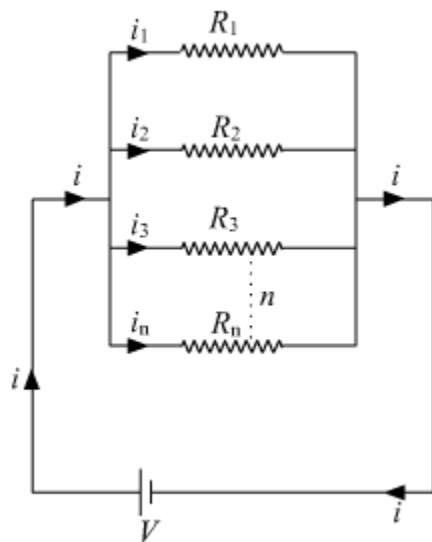
An electric lamp of resistance  $20\ \Omega$  and a conductor of resistance  $4\ \Omega$  are connected to a  $6\text{ V}$  battery as shown in the circuit. Calculate:



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

**SOLUTION:**

(a)



Let there are  $n$  resistances, each of value  $R_1, R_2, \dots, R_n$ , respectively, are connected in parallel to a battery of voltage  $V$ . if the equivalent resistance of the circuit is  $R_{eq}$ , then current drawn from the battery is  $i = \frac{V}{R_{eq}}$

The total current  $i$  then divides into  $i_1, i_2, i_3, \dots, i_n$ , respectively in the given resistors.

As all the resistances are connected in parallel, hence the voltage across each resistor is  $V$  volt.

Now we can write,

$$i = i_1 + i_2 + i_3 + \dots + i_{eq}$$
$$\frac{V}{R_{eq}} = \frac{V}{R_1} + \frac{V}{R_2} + \frac{V}{R_3} + \dots + \frac{V}{R_n} \dots \dots (1)$$

From eq. 1,

$$\frac{1}{R_{eq}} = \frac{1}{R_1} + \frac{1}{R_2} + \frac{1}{R_3} + \dots + \frac{1}{R_n}$$

Hence, reciprocal of the equivalent resistance is equal to the sum of reciprocal of each resistor joined in parallel

**(b)** Let net resistance of the given parallel combination be  $R_{net}$ , Then,

$$\frac{1}{R_{net}} = \frac{1}{12} + \frac{1}{12}$$
$$\frac{1}{R_{net}} = \frac{2}{12} = \frac{1}{6}$$
$$\Rightarrow R_{net} = 6 \Omega$$

$$\text{Hence, current, } i = \frac{V}{R_{net}} = \frac{6 \text{ V}}{6 \Omega} = 1 \text{ A}$$

**OR**

Resistance of electric lamp =  $20 \Omega$

Resistance of Conductor =  $4 \Omega$

Voltage of Battery =  $6 \text{ V}$

**(a)** The total resistance of the circuit =  $20 \Omega + 4 \Omega = 24$

**(b)** Current in the circuit =  $I$

Applying Ohm's law in the circuit,

$$V = IR$$
$$6 \text{ V} = I \times 24 \Omega$$
$$I = \frac{6 \text{ V}}{24 \Omega} = 0.25 \text{ A}$$

Hence current in the circuit is  $0.25 \text{ Ampere}$ .

**(c)** Potential difference across lamp,

$$V_{\text{lamp}} = IR$$

$$V_{\text{lamp}} = 0.25 \text{ A} \times 20 \Omega = 5 \text{ V}$$

$$\therefore V_{\text{lamp}} = 5 \text{ V}$$

Potential difference across conductor,

$$V_{\text{Conductor}} = IR$$

$$V_{\text{Conductor}} = 0.25 \text{ A} \times 4 \Omega = 1 \text{ V}$$

$$\therefore V_{\text{Conductor}} = 1 \text{ V}$$

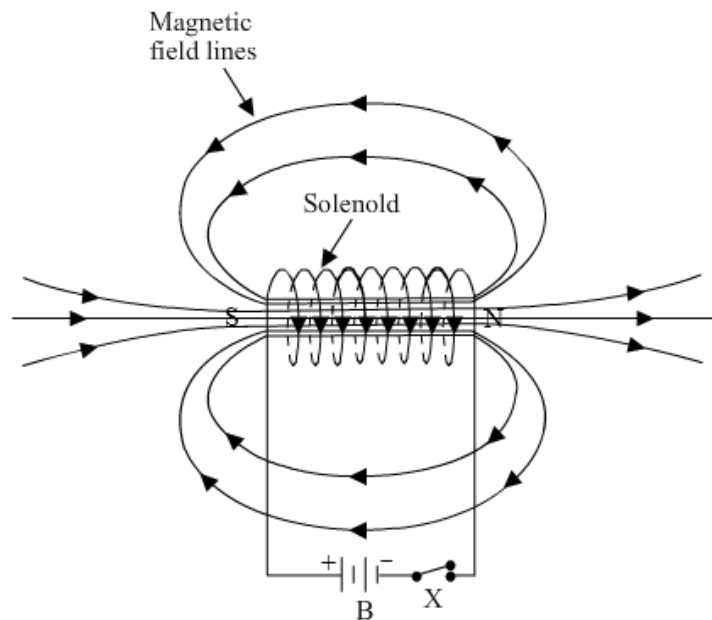
$$(d) \text{ Power of Lamp} = I^2 R = (0.25)^2 \times 20 = 1.25 \text{ W}$$

### Question 20

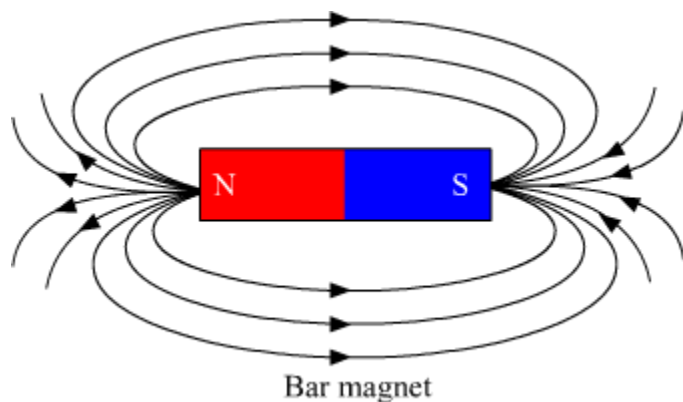
What is a solenoid? Draw the pattern of magnetic field lines of **(i)** a current carrying solenoid and **(ii)** a bar magnet. List two distinguishing features between the two fields.

### SOLUTION:

A solenoid is a long cylindrical coil of wire consisting of a large no. of turns bound together very tightly. **(i)**



**(ii)**



**Two distinguishing features between the two fields:**

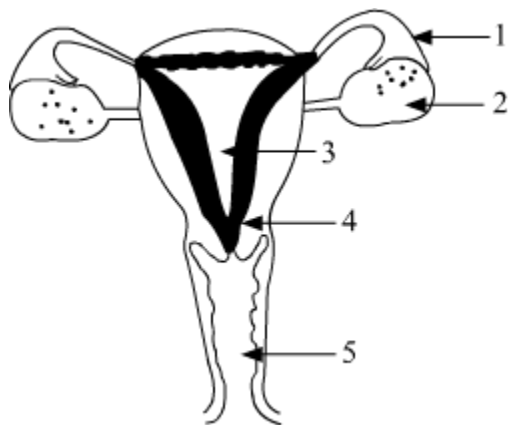
1. Magnetic field of the solenoid can be varied as per our requirements just by changing the current or core of the solenoid whereas the magnetic field of the bar magnet is fixed.
2. Magnetic field outside the solenoid is negligible as compared to the bar magnet.

### Question 21

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.

### SOLUTION:

Transfer of pollen grain from the anther of a flower to stigma is termed as pollination.

**Based on the transfer of pollen grains between plants, pollination can be of two types:**

**1) Self Pollination:** When pollen of a plant is transferred to the stigma of a flower on the same parent plant then it is termed as self-pollination.

**2) Cross Pollination:** When pollen of a plant is transferred to the stigma of a flower of a plant different from the one from which pollen is obtained then it is termed as cross-pollination.

Some of the most common agents of pollination that helps in carrying the pollen from the anther to the stigma of a flower are insects and wind.

As the pollen of the right type is deposited on to the stigma of the flower of the same species, quite often it leads to germination of pollen grain as a result of a chemical cross-talk between the pollen and the carpel. Germination leads to the growth and extension of the pollen tube through the style of the flower to its ovary. The pollen tube carries the male gametes all the way to the ovule inside the ovary, leading to fertilisation of male gamete with the female gamete inside the ovule.

**OR**

**(a) The labelled parts of the female reproductive system are as follows:**

1 - Oviduct or Fallopian Tube

2 - Ovary

3 - Uterus

4 - Cervix

5 - Vagina

**(b) Contraception** includes methods or ways to prevent fertilisation and pregnancy in a fertile female as a result of successful copulation between a fertile male and female.

**Some of the major advantages of adopting various contraceptive methods include:**

(i) Prevention of unwanted pregnancies

(ii) Help in family planning and population control

(iii) Some contraceptive devices like condoms and female diaphragm prevent spread of STDs like AIDS and Hepatitis B.

## **Question 22**

In the experimental set up to show that "CO<sub>2</sub> is given out during respiration", name the substance taken in the small test tube kept in the conical flask. State its function and the consequence of its use.

**SOLUTION:**

In the above mentioned experimental setup, lime water is taken in a small test tube which is kept in the conical flask.

Lime water is used to detect the presence of carbon dioxide.

When carbon dioxide passes through lime water, it turns milky due to the formation of calcium carbonate.

Hence, it is used in the above experiment to check whether  $\text{CO}_2$  is released during respiration.

### Question 23

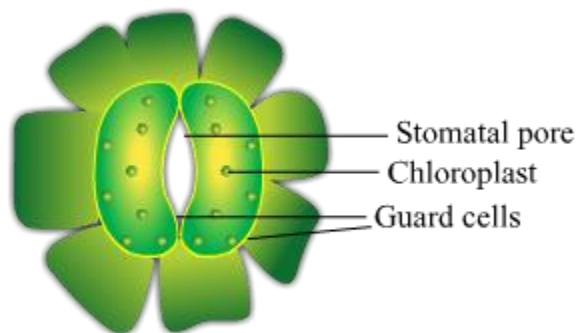
A student is observing the temporary mount of a leaf peel under a microscope. Draw labelled diagram of the structure of stomata as seen under the microscope

OR

Draw a labelled diagram in proper sequence to show budding in hydra.

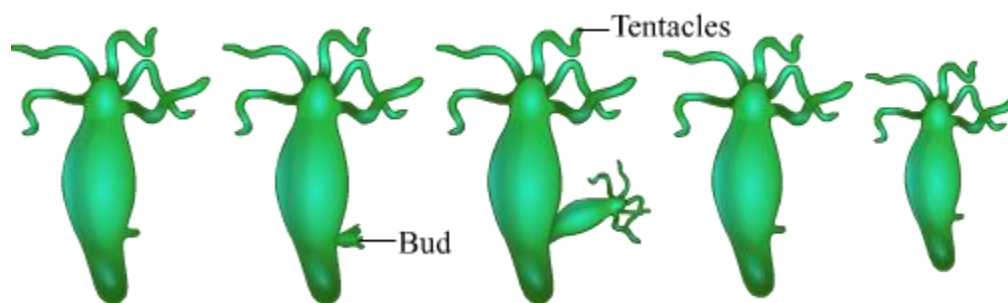
### SOLUTION:

#### Structure of stomata



OR

#### Budding in Hydra



### Question 24

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

### SOLUTION:

**Following are the precautions while making the image by the help of convex lens:**

- 1.) Fix the convex lens vertically in the lens holder.
- 2.) The base of the lens and white screen should be in a line with the measuring scale.
- 3.) Record the position of the lens and screen only when a well defined sharp image is formed.
- 4.) There should not be any obstacle in the path of the convex lens.

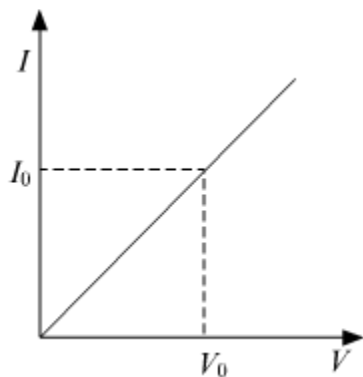
### Question 25

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

**OR**

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

### SOLUTION:



Straight line graph between potential difference( $V$ ) and current( $I$ ) shows that resistor is a linear element and follows Ohm's Law.

### Calculation of Resistance:

At any point on the graph, resistance is given as,  $R = \frac{V_o(\text{value of potential difference at that point})}{I_o(\text{value of current at that point})}$

In other words, the Slope of the graph at any point gives the value  $\frac{1}{R}$ ,

Hence,

$$\text{slope} = \frac{I_o}{V_o} = \frac{1}{R}$$

$$\Rightarrow R = \frac{1}{\text{slope}} = \frac{V_o(\text{Value of Potential difference at that point})}{I_o(\text{Value of Current at that point})}$$

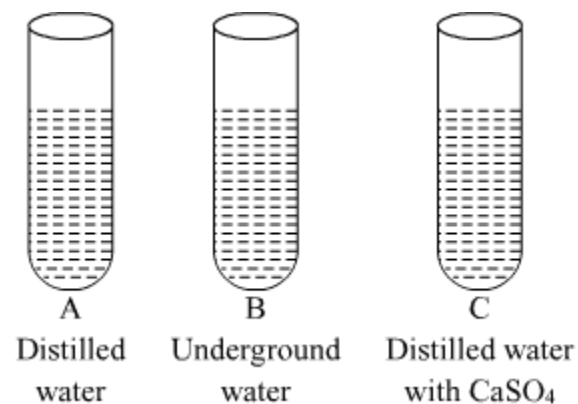
OR

This is called the zero error of the scale of ammeter or voltmeter. If there is a zero error, then this error is subtracted from the value that depicts when the circuit is closed, otherwise, the accurate current or potential difference will not be recorded.

### Question 26

In three test tubes A, B, and C, three different liquids namely, distilled water, underground water and distilled water in which a pinch of calcium sulphate is dissolved, respectively are taken. Equal amount of soap solution is added to each test tube and the contents are shaken. In which test tube will the length of the foam (lather) be longest? Justify your answer.

### SOLUTION:



Test tube A contains distilled water which is considered as soft water, free from ions like  $\text{Mg}^{2+}$ ,  $\text{Ca}^{2+}$ , etc. So, in this case, the length of foam will be the longest(maximum).

Test tube B contains underground water which contains ions like  $\text{Mg}^{2+}$ ,  $\text{Ca}^{2+}$ , etc. which react with soaps to form salts of fatty acids called scum, which are insoluble in water. So, in this case, the length of foam will be the less in comparison to test tube A.

Test tube C contains distilled water with  $\text{CaSO}_4$ , which contains  $\text{Ca}^{2+}$  ions which react with soaps to form salts of fatty acids called scum, which are insoluble in water. So, in this case also, the length of foam will be the less in comparison to test tube A.

### Question 27

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

**OR**

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

### SOLUTION:

Test tube A contains dil. HCl and test tube B contains dil. NaOH. On adding blue litmus solution to both the test tubes, the colour of the test tube A will change from blue to red. This is because HCl is an acid and acids turn blue litmus to red.

**OR**

On adding dilute hydrochloric acid to sodium carbonate taken in a clean and dry test tube, a brisk effervescence will be observed due to the evolution of carbon dioxide gas.

