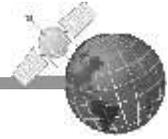




1 Crop Production



Exercises

Section I

A. Select and tick (3) the correct option :

Ans. 1. b. 2. b. 3. a. 4. c.

B. Fill in the blanks :

- Ans.**
1. The **crop** refers to anything produced from soil.
 2. The process of loosening and turning up of the soil is called **tilling** or **ploughing**.
 3. **Farmyard manure** is the most valuable organic matter commonly applied to the soil.
 4. **Pesticides** include insecticides and rdenticides.
 5. Fish liver oil is rich in vitamin **A** and vitamin **D**.

C. Write true or false :

Ans. 1. false 2. true 3. true 4. false 5. true

Section II

A. Very short answer questions :

- Ans.**
1. Agriculture is the technology of food production from plants by sowing seed in the soil and obtaining, procuring and storing plant produce.
 2. Some commonly used implements are

• Plough	• Seed drill	• Khurpa
• Hoe	• Cultivator	
 3. Broadcasting is the method of sowing seeds manually by hand in the field.
 4. We need to protect crops from pests and diseased because they harm the crop plants and bring down the production.
 5. The nitrogen fixation involves the fixing of the atmospheric nitrogen into simple nitrogen compounds such as ammonia and oxides of nitrogen by the action of atmospheric factors such as lightning or by simple living organisms such as free-living nitrogen-fixing bacteria.

B. Short answer questions :

- Ans.**
1. The early man was a nomad and lived in caves. He wandered in small groups from place to place for food and shelter. He used to gather fruits, nuts, leaves, stems and roots. He also used stone tools for hunting animals and ate them raw. Therefore, the early man was called a hunter-gatherer. Around 10,000 BC man by chance discovered that seeds can be sown to grow plants. This was the beginning of agriculture and also the beginning of settled life. Man settled close to river banks and water bodies, and thus

farming communities developed. Gradually, man discovered tilling, planting and harvesting the right species of plants and rearing animals for his needs.

2. Some important and commonly used manures are :

Farmyard manure : This type of manure mainly consists of animal dung, straw, leaves etc.

Green manure : It consists of agricultural waste, commonly from the leguminous crops which is ploughed back into the soil.

Compost manure : Compost is made from the cattle-shed wastes and dry leaves etc.

3. Transplantation method has the following advantages :

- Transplantation enables selective cultivation of healthy seedlings. This results in better crop production.
- Transplantation permits better root penetration into the soil.
- Transplantation allows better shoot development.

4. **Sprinkler system** : This method is used where the soil cannot retain water for long or where sufficient water is not available. Rotating nozzles are attached to perpendicular pipes at regular intervals. Water is sprinkled on crop as if it is raining.

Drip system : This system involves providing water drop by drop at the roots of the plants. Thus water is not wasted. This system is practiced in regions where water availability is poor.

5. Though we get most of our food from crop plants, animals also provide us food. The food provided by animals consists of milk, eggs and meat. The food obtained from animals is very rich in proteins. In fact, animal food provides certain proteins which are not present in plant foods. Most of the food obtained from animals also contains a good amount of fat but it contains very little of carbohydrates.

C. Long answer questions :

- Ans. 1. Two of the agricultural implements are as follows :

Plough : The plough is used for loosening and turning of the soil. Ploughs are made of wood or iron. Traditional ploughs, made of wood or iron, are driven by animals or by a tractor. The tractor driven plough is called cultivator.

A plough contains a thick triangular iron strip called ploughshare. The main part of the plough is a long log of wood which is called ploughshaft. There is handle at the lower end of the shaft and a beam at the upper end. The beam is placed over the animal necks.

Nowadays, ploughs made of iron are being used.

Hoe : The implement called hoe is used for removing weeds and for loosening the soil.

It consists of a long rod of wood or iron. A strong broad and bent plate of iron is fixed at one end of the long rod. This bent plate acts like a blade. At

the other end of the rod a beam is attached. The beam is placed on the bullocks necks.

2. Differences between a Manure and a Fertilizer.

Manure	Fertilizer
1. A manure is natural substance which is formed from dead, decaying organic matter and animal wastes.	1. A fertilizer is a salt or an inorganic compound which is formed in factories from chemicals.
2. A manure provides more than one nutrient to the soil.	2. A fertilizer provides a specific nutrient to the soil.
3. A manure acts very slowly on soil.	3. A fertilizer is quick in action.
4. If applied in large quantities, it does not harm the plant.	4. If applied in large quantities, it may spoil the plants.

3. Organisms such as rodents and insects which attack and damage crops are called pests. Insects such as termites eat the roots of plants. Locusts fly in swarms, attacking the sugar cane and wheat crops. Pests can be controlled by spraying chemicals known as pesticides.

Pesticides include insecticides and rodenticides. Insecticides like DDT (Dichloro Diphenyl Trichloroethane), BHC (Benzene Hexachloride or gammaxene) and malathion kill insects while rodenticides like zinc phosphide and warfarin kill rodents.

Microorganisms like bacteria, fungi and viruses cause numerous diseases in crops. For example, wheat rust, wheat smut and potato blight are caused by fungi. Wilting of plants is caused by a bacterium which blocks xylem, the water conducting tissue in plants.

Fungi are destroyed by spraying fungicides like copper sulphate, Biological control of pests involves the use of an organism to kill the pests.

4. Proper storage of food grains keeps away pests. Some ways to prevent pests from damaging food grains are :
- Grains should be stored in airtight containers in a cool dry place.
 - Dried neem leaves and turmeric are sometimes used when storing food grains as they keep pests such as insects away.

Conditions : Right levels of temperature and moisture must be maintained to prevent growth of pests. The grains should be properly dried in the sun to reduce moisture content before they are stored. Large-scale storage is done in huge granaries and silos.

5. Nitrogen is an important constituent of proteins, the body-building foods and the nucleic acids, the carriers of the genetic information from one generation to the next. However, though required for growth and development, most living organisms cannot utilize it directly, despite its 78% presence in air by volume. It has first to be transformed into nitrogen-rich compounds. The different ways used to fix nitrogen in

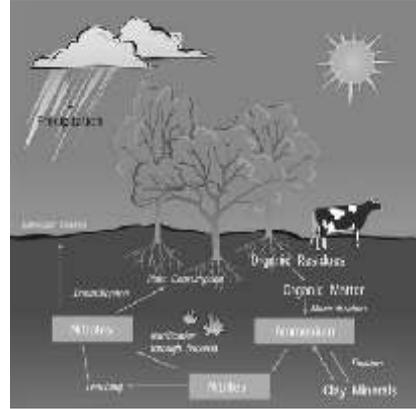
gaseous state back into the atmosphere on decomposition of nitrogenous compound make up the global nitrogen cycle.

The nitrogen cycle involves three steps:

Nitrogen fixation, nitrification and denitrification.

D. Higher Order Thinking Skills (HOTS) :

- Ans.** 1. The sprinkler system uses the last drop of water. It provides water to all the plants simultaneously. No water is wasted in this system of irrigation.
2. a. The reason could be lack of proper irrigation facilities, unavailability of a high yielding variety of seeds, fertilizers etc.
- b. The yield was increased due to sustained efforts of farmers to increase the production.

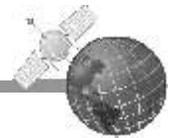


Nitrogen cycle



2

Microorganisms : Friend and Foe



Exercises

Section I

A. Select and tick (3) the correct option :

- Ans.** 1. a. 2. c. 3. b. 4. d.

B. Fill in the blanks :

- Ans.** 1. **Microbiology** is the branch of science that deals with the study of microorganisms.
2. Bacilli is the most common shape of **bacteria**.
3. The size of **viruses** ranges from 0.015 to 0.2 microns.
4. Iodine is produced by the marine brown algae called **chlorella**.
5. A paramecium is covered with short hair-like structures called **cilia**.

C. Write true or false :

- Ans.** 1. true 2. true 3. true 4. false 5. false

D. Match the micro-organisms in column A with their action in column B :

- | | | |
|-------------|---------------|---------------------------------|
| Ans. | A | B |
| 1. | Bacteria | g. Producing antibiotics |
| 2. | Rhizobium | a. Fixing nitrogen |
| 3. | Lactobacillus | b. Setting of curd |
| 4. | Yeast | c. Baking of bread |
| 5. | A protozoan | d. Causing malaria |
| 6. | A virus | f. Causing AIDS |
| 7. | Penicillium | e. Causing cholera |

Section II

A. Very short answer questions :

- Ans.** 1. Microorganisms are tiny organisms which can be seen only through a microscope.
2. Microorganisms can be classified into following five groups :
- Bacteria
 - Viruses
 - Algae
 - Fungi
 - Protozoans
3. Diseases like poliomyelitis, chicken-pox, AIDS, mumps, common cold, influenza and measles are caused in humans by viruses.
4. Protozoans are unicellular animals without chlorophyll. Amoeba and paramecium are examples of protozoans.
5. The period of time for which a food item can be kept before it is too old to be sold is called its shelf life.

B. Short answer questions :

- Ans.** 1. Bacteria are found in all the places wherever life is possible. They are in the air you breathe, the food you eat, and the soil upon which you walk. They are on almost anything you touch. A large number of bacteria also occur in animal and human bodies.
2. Fungi are a large group of organisms. Fungi are plants-like heterotrophs. They are like plants because they are stationary. They are heterotrophic because they do not have chlorophyll. They obtain their food from dead organic matter or living organisms.
3. The harmful effects of fungi are as follows :
- a. **Decay of wood :** Some fungi grow on timber-yielding plants such as sal, teak, deodar, etc. These fungi secrete decomposing enzymes and cause heart rot.
 - b. **Plant diseases :** Some fungi infect many economically important plants and minimise the yield of food considerably. For example, potato blight is caused by a fungus. Rust of wheat is a fungal disease which is spread by air and seeds.
4. Food preservation is the process of treating food in order to slow down or stop its spoilage, thereby maintaining its nutritive value, texture and flavour.
5. In freeze-drying, food is frozen and kept in vacuum (in the absence of air). In vacuum, water (ice) sublimates, i.e. changes from the solid to vapour (gaseous) state directly. This process is used to make instant coffee and store fruits such as apples.

C. Long answer questions :

- Ans.** 1. This can be proved by the given activity :
- Observation of microorganisms present in water
- Collect water from different sources, like drain, well, canal, lake, pond and river in clean glass test tubes.
 - Allow these samples to settle down.

- Observe first with naked eye and then with a magnifying glass.
- Put a drop of water (from each sample one by one) on a glass slide and observe it under a microscope.

What do you observe?

- You will observe that many small organisms may be seen under a microscope. These organisms could not be seen when observed through the naked eye.
 - Write the number and type of organisms observed in different sources of water.
 - What conclusion can you draw from this activity?
2. Some of the harmful effects of bacteria are as follows :
 - a. **Food poisoning** : Numerous bacteria are found in the food preparations. Some of these excrete toxic substances and cause food poisoning. This counteracted by modern methods of canning, refrigeration and freezing.
 - b. **Human diseases** : Many bacteria are parasites which infect the human body and cause various diseases. These include tetanus, tuberculosis, diphtheria, anthrax, leprosy, etc.
 - c. **Plant diseases** : Many plant diseases are caused by bacteria. Blight of paddy, citrus canker, soft rot, bacterial rot (tundu), etc., are some diseases caused by bacteria.
 3. Economic importance of algae is as follows :
 - Aquatic as well as terrestrial animals including human beings consume green algae as food.
 - Brown algae specially the kelps and red algae are used as fodder.
 - Many brown algae when added in land increase the fertility of the soil.
 - Some blue-green algae fix the atmospheric nitrogen.
 - Algae like Chlorella are used in fish cultivation.
 - Iodine is produced by the marine brown algae (Laminaria).
 - Algin obtained from brown algae is used in the manufacture of ice-creams and in artificial silk industry.
 - Agar-agar, a gelatin-like substance, is used as a solidifying agent in the preparation of medicines and some food products.
 - In sewage-treatment plants, algae are used to help break down sewage into harmless chemicals.
 4. Protozoans are classified according to the way they move. Some protozoans move by changing their shape, some move using cilia, while the others move using flagella.

An Amoeba moves by changing its shape sending out pseudopodia. Pseudopodia are finger-like projections in its body. The name means false feet. A pseudopodium forms in any direction. Thus, Amoeba moves in that direction. Amoebas also use pseudopodia to obtain food, which

may be other protists or bits of dead matter. When an Amoeba locates a food particle, its pseudopodia surround and trap the food particle and some water food. Food inside the vacuole is broken down to provide energy and material for the growth.

A paramecium is covered with short hair-like structures called cilia. It uses cilia for movement. It moves through water by beating its cilia. Along one side of a paramecium is a groove lined with cilia. Food enters the cell along the groove. The food is digested inside vacuoles.

5. Two methods of food preservation are :

Refrigeration and Freezing : Refrigeration at low temperatures is a method that slows down the activity of microorganisms. Bacteria and fungi cannot thrive at low temperatures as enzymes (any of numerous proteins produced in the cells which accelerate the metabolic processes of an organism) remain inactive at a low temperature. Therefore, food takes a longer time to decay and its nutritive value is also preserved for long. Freezing is used for preserving fresh fruits, vegetables, meat and fish.

Freezing food is a common method of food preservation. It slows down food decay and checks growth of bacteria.

Generally, refrigeration and freezing do not affect the flavour or texture of the food but often cause the fruits to become mushy.

Canning : Storing the cooked and sterilised food in air-tight containers is another method of preserving it. Since canning makes the food completely sterile, it does not decay until the can (sealed container) is opened. Jams, pickles, fish, vegetables, etc. are canned and sold in the market.

D. Higher Order Thinking Skills (HOTS) :

- Ans.** 1. Viruses, unlike other microorganisms, do not have a well body and other structures like nucleus or mitochondria.
2. That is so because in summer bacteria grows faster due to increase in temperature.



3

Synthetic Fibres and Plastics



Exercises

Section I

A. Select and tick (3) the correct option :

- Ans.** 1. a. 2. b. 3. c. 4. b.

B. Fill in the blanks :

- Ans.** 1. **Cellulose** is made of large number of glucose molecules.
2. Nylon is mixed with **wool** to make it last longer.

3. Synthetic clothes should not be worn in the **summer**.
4. Repeated **heating** and **cooling** do not alter the chemical nature of plastics.
5. **Bakelite** is hard, stiff and a poor conductor of heat and electricity.

C. Write true or false :

Ans. 1. false 2. true 3. true 4. true 5. true

Section II

A. Very short answer questions :

- Ans.** 1. Man-made fibres are those fibres that are artificially made and synthesised.
2. Nylon
 3. Acrylic is used for making sweaters, shawls, blankets and carpets.
 4. Hydrophobic is a word used for a substance that repel moisture (e.g., sweat) and do not absorb it.
 5. Plastics can be moulded into the desired shape.

B. Short answer questions :

- Ans.** 1. Polymerisation is the process of joining monomers repeatedly to form polymers.
2. Nylon is used to make stockings for women. It is also used to make swimwear, ropes, combs, zip fasteners, hooks and even machine parts.
 3. Synthetic fibres have many advantages over natural fibres :
 - (i) Synthetic fibres do not depend either on an agricultural crop as cotton, flax and jute do or on animal farming as silk and wool do.
 - (ii) Synthetic fibres are much stronger, and hence more durable than natural fibres. They dry easily and have faster colours.
 - (iii) Synthetic fibres are not easily acted upon by moisture, chemicals or bacteria.
 - (iv) They are generally cheaper than natural fibres.
 4. Thermoplastics are called so because they can be heated and cooled again and again to mould into different shapes.
 5. Unlike iron, plastics do not react with water and air. Therefore, they do not corrode easily. That is why they are used to store different kinds of chemicals.

C. Long answer questions :

- Ans.** 1. Nylon is a polymer which was developed after World War II. The first fully-synthetic fibre, it was made without using any natural material. It was prepared from coal, water and air. The word 'nylon' is formed from the initial letters of New York (NY) and London (LON), as it was first produced in these cities. It is one of the strongest, most elastic and lightest fibres. Nylon was first used to make stockings for women. It remains stable and strong even when wet. It absorbs very little water. Thus, it is most suitable for making fishing nets. Nylon is not affected by the action of bacteria and fungus. Nylon fabrics do not form wrinkles. It is also used to make swimwear, ropes, combs, zip fasteners, hooks and even

machine parts. Nylon is mixed with wool to make it last longer.

It is the strongest among all fibres hence it is also used to make parachutes and ropes for rock climbing.

2. Polyester fibres include terylene, terene, dacron, etc. These fibres are generally obtained from petroleum products and generally contain the ester group in their main chain.

Polyesters may be produced in numerous forms such as sheets and three-dimensional shapes. Fabrics made from polyester are more durable, affordable, strong, crease resistant, mothproof, easy to wash, stain resistant and dry quickly. These fibres are generally blended with other fibres to form better quality fabrics like polycot (mixture of polyester and cotton), polywool (mixture of polyester and cotton), polywool (mixture of polyester and wool), terrycot (mixture of terylene and cotton).

3. Synthetic fibres suffer from the following disadvantages :
 - (i) Clothes made of pure synthetic fibres are garishly lustrous.
 - (ii) Synthetic fibres melt before burning. So clothes made of such fibres stick to the skin when in contact with a flame, causing burns. Therefore, they should not be worn in the kitchen or while setting off fireworks.
 - (iii) Synthetic fibres are generally hydrophobic, i.e., they repel moisture (e.g., sweat) and do not absorb it. They do not allow enough circulation of air either. So clothes made of synthetic fibres are not comfortable to wear as they do not allow sweat to evaporate easily. Natural fibres are hydrophilic, i.e., they absorb moisture. They also allow the circulation of air. Therefore, clothes made of natural fibres are comfortable to wear as they allow sweat to evaporate.
 - (iv) Some electrical charge accumulates on synthetic fibres due to which they cling together as well as to the skin. The electrical charge irritates the skin.

4. **Thermoplastics** : They are the plastics which soften easily on heating and harden on cooling. They can be heated and cooled again and again to mould into different shapes. Polyethene, PVC, polystyrene, perspex, and teflon are some of the examples of thermoplastics. These are used for manufacturing toys, combs, electric cables, pipes, packaging materials, wind screens of cars, and nonstick cookwares.

Thermosetting Plastics : These are the plastics that can be softened by heating only once. Once they are moulded and hardened, cannot be softened again on heating. Bakelite and melamine are the two main examples of thermosetting plastics. They can maintain their shape and size even at very high temperatures.

5. We can take following measures to limit the harmful effects associated with the plastics.
 - Avoid the use of plastics as far as possible.

- Buy products without or little plastic packaging.
- Use bags made of cotton or jute or recycled paper when you go for shopping.
- Collect and dispose off biodegradable and non-biodegradable wastes separately.
- Do not throw plastic wastes in the streets, on the pavement or in drains.
- Try to minimize the use of plastic materials, e.g., use a steel lunch box instead of a plastic one.
- As a responsible citizen remember the 4R principle—Reduce, Reuse, Recycle and Recover.
- Develop environment friendly habits.

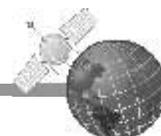
D. Higher Order Thinking Skills (HOTS) :

- Ans.** 1. It is said that use of synthetic fibres actually helps in conserving forests because they do not required natural materials such as wood. This prevents the cutting of forests.
2. a. Melamine b. Teflon c. Bakelite
d. PVC e. Bakelite f. Polystyrene



4

Metals and Non-Metals



Exercises

Section I

A. Select and tick (3) the correct option :

- Ans.** 1. a. 2. b. 3. c. 4. b.

B. Fill in the blanks :

- Ans.** 1. **Ores** are the minerals from which metals can be extracted conveniently and profitably.
2. Non-metals cannot be beaten into thin **sheets** or **foils**.
3. Magnesium burns in air to form **magnesium oxide**.
4. **Copper** does not react with hydrochloric acid but reacts with sulphuric acid.
5. A **less** reactive metal cannot replace a **more** reactive metal.

C. Write true or false :

- Ans.** 1. false 2. true 3. true 4. false 5. true

Section II

A. Very short answer questions :

- Ans.** 1. Iron, copper, silver, gold, tin, aluminium, mercury, etc. are examples of metals.
2. • Sulphur is mined in its free state or as sulphide ore from the Earth's crust.
• Chlorine gas is produced by the electrolysis of common salt.

3. This property of metals is known as sonority.
4. This element is a non-metal.
5. $\text{Mg} + \text{O} \rightarrow \text{MgO}$

B. Short answer questions :

Ans. 1. Two physical properties on the basis of which metals can be distinguished from non-metals are as follows :

(i) **Physical State :** All metals are generally solid at room temperature, except mercury and gallium which are liquid at room temperature. Iron, copper, aluminium, gold, silver are some of the examples of metals.

Non-metals may be solid, liquid or gases at the room temperature. For example, carbon, sulphur and phosphorus are solid non-metals, bromine is a liquid non-metal whereas hydrogen, oxygen, nitrogen and chlorine are gaseous non-metals.

(ii) **Lustre :** Metals are lustrous, that is, they have a shining surface and can be polished. Non-metals are not lustrous nor do they have a shiny appearance except iodine and graphite which are lustrous in appearance.

Metals, except sodium and potassium, have high densities. Sodium and potassium have much lower densities.

2. (i) **Hardness :** Non-metals usually have low densities and are soft. Diamond, however, is an exception. Diamond is the hardest natural substance known.

(ii) **Ductility :** The property by virtue of which metals can be drawn into wires is called ductility. Non-metals are brittle and cannot be drawn into a wire.

(iii) **Conduction of heat and electricity :** Almost all metals conduct heat and electricity. But non-metals do not conduct electricity. Graphite is an exception. It conducts electricity in spite of being non metal.

3. Element A is non-metal.

4. Metals react with bases to form salts and hydrogen gas.

$\text{Metal} + \text{Base} \rightarrow \text{Salt} + \text{Hydrogen}$

Aluminium is a metal and sodium hydroxide is a base. When aluminium is heated with sodium hydroxide solution, then sodium aluminate (salt) and hydrogen gas are formed :

$\text{Sodium hydroxide} + \text{Aluminium} \rightarrow \text{Sodium aluminate} + \text{Hydrogen}$
 $(\text{NaOH}) \quad (\text{Al}) \quad (\text{NaAlO}_2) \quad \text{H}_2$

Zinc metal also reacts with sodium hydroxide solution to form hydrogen gas. Thus, aluminium and zinc are the two common metals which react with bases (like sodium hydroxide) to produce hydrogen gas. In general we can say that : Some metals react with sodium hydroxide to produce hydrogen gas.

5. In displacement reactions, a more reactive metal replaces a less reactive

metal from its compound. However, vice versa is not possible i.e., a less reactive metal cannot replace a more reactive metal.

C. Long answer questions :

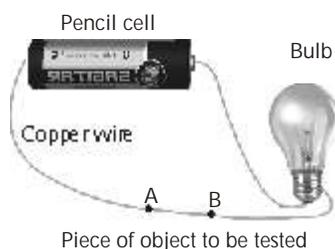
Ans. 1. Like metals, most non-metals occur in nature in a combined state. However, some non-metals occur both in a free state and a combined state :

- Oxygen and nitrogen occur in a free state in air and in a combined state in the Earth's crust.
- Sulphur occurs in a free as well as a combined state in the Earth's crust.
- Five out of the six noble gases, i.e., helium, neon, argon, krypton and xenon occur only in a free state in nature.

2. We can show this with the help of following activity :

Take a small sample of aluminium wire, copper wire, coal piece, sulphur, iron nail.

- Connect a pen light cell as shown in the diagram with the help of connecting wires.
- Connect the two free ends of the copper wire to the objects one by one. See if the bulb glows or not.
- Record your observations.



S.No.	Material	Good conductor/Poor conductor
1.	Aluminium	Good conductor
2.	Coal piece	Poor conductor
3.	Sulphur	Poor conductor
4.	Iron nail	Good conductor

You will notice that metals are good conductors while sulphur and coal are bad conductors of electricity.

Metals are, thus, used for making electrical cables and wires.

Graphite which is a non-metal is an exception to the rule that non-metals are poor conductors of electricity.

3. Metals react with oxygen to form their oxides. Different metals react with oxygen under different conditions.

Metal + oxygen \rightarrow metal oxide

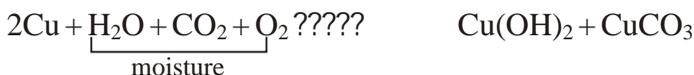
Sodium reacts with oxygen at room temperature to form sodium oxide.

Magnesium on heating, burns in air to form magnesium oxide (MgO).

The metallic oxides formed are basic in nature and turn red litmus solution blue.

Have you seen a greenish deposit on the surface of copper vessels, when exposed to air for long?

This occurs due to the formation of a mixture of copper hydroxide and copper carbonate which is green in colour.



4. Five characteristics of metals and non-metals are as follows :
Metals : (i) Most metals are solids at room temperature. (ii) Most metals have a metallic shine called lustre. (iii) Most metals are hard (iv) Most metals can be drawn into thin wires. (v) Most metals react with air, i.e., oxygen to form metal oxides.
Non-metals : (i) Most non-metals are in their gaseous state at room temperature. (ii) Non-metals do not have lustre. (iii) Most non-metals are soft. (iv) Non-metals are neither malleable, non ductile (v) Non-metals react with oxygen to form acidic oxides.
5. Metals and non-metals are an integral part of our day-to-day lives. We use doors, windows and airplanes made of aluminium. We use coins made of metals like copper, zinc and nickel. Similarly, non-metals such as helium, carbon, nitrogen, oxygen, neon, sulphur and chlorine also play a very important role in our lives. Oxygen gas is used in hospitals, nitrogen is used to make fertilizer and solid carbon is used in pencils. Metals and non-metals are used in a number of ways like in making tools, machines, automobiles, ships, houses, malls, bridges, jewellery, utensils, electrical wire, in making alloys and so on.

D. Higher Order Thinking Skills (HOTS) :

- Ans.** 1. Reaction a. will not occur because copper is less reactive than zinc.
 2. a. Aluminium; zinc b. Hydrogen



5 Coal and Petroleum



Exercises

Section I

A. Select and tick (3) the correct option :

- Ans.** 1. c. 2. a. 3. b. 4. c.

B. Fill in the blanks :

- Ans.** 1. **Inexhaustible natural** resources are not likely to get exhausted by human activities.
 2. Most minerals are obtained from **lithosphere**.
 3. Coal gas is an excellent **gaseous** fuel.
 4. Petroleum is separated into useful substances by **fractional distillation**.
 5. **Natural gas** releases more energy than any other fuel.

C. Write true or false :

- Ans.** 1. true 2. false 3. true 4. true 5. false

Section II

A. Very short answer questions :

- Ans.** 1. Things occurring naturally on, above and under the surface of the Earth

are known as natural resources.

2. Peat, lignite, bituminous coal and anthracite are the four varieties of coal.
3. Petroleum oil is found beneath the layers of rocks.
4. Fractional distillation is a process of the separation of petroleum into different fractions.
5. We should conserve fossil fuels as they are limited in quantity and will exhaust sooner or later.

B. Short answer questions :

Ans. 1. The resources which are present in an unlimited quantity in nature and are not likely to get exhausted by human activities are called inexhaustible natural resources.

Examples : Wind, Water, Sunlight, etc. are inexhaustible natural resources.

2. Minerals are the backbone of industry. Most minerals are obtained from lithosphere (the upper layer of the Earth). Some important minerals are,
 - Rock salt • Mica • Coal • Petroleum
 - Metals and their ores • Limestone • Sand
 - These minerals were formed due to very slow processes taking place inside the Earth.
 - These minerals are distributed in the Earth's crust differently.
 - These minerals are mined from the Earth, and processed to obtain useful products.
3. Coal was formed by the decomposition of large land plants and trees buried under the Earth about 300 million years ago. This happened as follows : About 300 million years ago, the Earth had dense forests in low-lying wet land areas. Due to natural processes like earthquakes, volcanoes and floods, etc., these forests were buried under the surface of Earth. As more soil deposited over them, they were compressed. The temperature also rose as they sank deeper and deeper. Due to high pressure and high temperature inside the Earth, and in the absence of air, the wood of buried forest plants and trees was slowly converted into coal. This process is called carbonisation.
4. The major products (or fractions) of petroleum refining are petroleum gas, petroleum ether, gasoline, kerosene, diesel, lubricating oil, paraffin wax, pitch or tar, petroleum cake.
 - Petroleum gas is used as domestic fuel.
 - Gasoline is used as motor fuel.
5. When natural gas is compressed by applying pressure, it is called compressed natural gas. It is used in heating.

C. Long answer questions :

Ans. 1. The materials obtained from nature are classified as natural resources. For example, air, water, soil, wild life, forest, coal, petroleum, etc. On the basis of their availability, various natural resources can be broadly

divided into two categories exhaustible and inexhaustible.

Exhaustible Natural Resources : The natural resources which can be exhausted as a result of human consumption are called exhaustible natural resources. For example, coal, petroleum, water, forests, minerals, natural gas, etc.

Inexhaustible Natural Resources : The natural resources which are not likely to be exhausted due to human activities and are present in unlimited quantities are called inexhaustible natural resources. For example, air and sunlight.

2. **Coal is a Source of Energy :** Coal is mainly carbon. When heated in air, coal burns and produces mainly carbon dioxide gas. A lot of heat energy is also produced during the burning of coal. This can be written as :



Coal is important because it can be used as a source of heat energy as such (just by burning it), or it can be converted into other forms of energy such as coal gas, coke or electricity. The real source of energy of coal is the solar energy (or Sun's energy). This is because the plants and trees which decomposed to form coal grew on the Earth by absorbing sunlight energy during the process of photosynthesis.

3. Petroleum oil is found beneath the layers of rocks. It is a viscous dark coloured liquid which occurs deep inside the Earth. It is formed from the remains of tiny organisms living in the sea, that died millions of years ago. The marine organisms died and their bodies sank to the bottom of the sea. Gradually they got covered with sand and clay. Enormous heat and pressure and absence of air over millions of years, transformed the dead organisms into petroleum and natural gas.
4. We can conserve fossil fuels by the following ways :
- Drive at constant and moderate speed.
 - Switch off engine at traffic lights or at other places, where you have to wait.
 - Maintain correct air pressure in the tyres.
 - Get your vehicle serviced regularly.
 - Use good quality petrol and engine oil.

Remember that the burning of fuels is also a major cause of air pollution which in turn causes global warming. So, minimise the use of fuels.

D. Higher Order Thinking Skills (HOTS) :

- Ans.** 1. P : Natural gas; Q : Methane; R : Hydrogen; S : Compressed natural Gas (CNG)
2. Petroleum is called black gold because in the modern world its importance is equal to that of gold.



6

Combustion and Flame



Exercises

Section I

A. Select and tick (3) the correct option :

Ans. 1. d 2. a 3. d 4. a

B. Fill in the blanks :

- Ans. 1. **Combustion** is the process of burning of a substance in the presence of oxygen.
2. Paper, wood and kerosene are categorized as **combustible** substances.
3. **Carbon dioxide** gas is not a supporter of combustion.
4. Luminous zone is the pale **yellow** coloured zone.
5. **Pollutants** in the air cause many diseases and reactions in human beings.

C. Match the following :

- | | |
|-------------------------|----------------------------------|
| Ans. 1. Wood | b. Partial combustion |
| 2. Ignition temperature | c. Inflammable substances |
| 3. Insufficient air | a. Incomplete combustion |
| 4. Yellow flame | e. Non-luminous |
| 5. Compounds of sulphur | f. Acid rain |
| 6. Carbon dioxide | d. Fire extinguisher |

Section II

A. Very short answer questions :

- Ans. 1. Combustion is a chemical reaction which involves the burning of fuel in the presence of air or oxygen that is accompanied by the production of heat or both heat and light
2. The three conditions necessary for combustion are :
(i) Presence of a combustible substance
(ii) Presence of a supporter of combustion
(iii) Attainment of ignition or kindling temperature of the combustible substance
3. The lowest temperature at which a substance catches fire and starts burning is called its ignition temperature.
4. The amount of heat energy produced on complete combustion of a kilogram of fuel is called its calorific value.
5. Only solid and liquid fuels which vapourise on heating burn with a flame.

B. Short answer questions :

- Ans. 1. The substances which catch fire easily and give a lot of heat and light are called combustible substances. In simple words, combustible substances are actually food for fire. For example, paper, cloth, alcohol, ether, kerosene oil and LPG are some combustible substances.
2. A substance burns above its ignition temperature or kindling temperature. The ignition temperature, therefore, is the temperature at or above which a substance starts burning. Every substance has a definite ignition

temperature which may be as low as 35°C (white phosphorous) or as high as 260°C (red phosphorous).

3. Sometimes, a large volume of gas is liberated in combustion besides the production of heat and light. The sudden evolution of large quantities of gas creates excessive pressure that produces a loud noise. Such combustion is known as an explosion.
4. A flame is a region where combustion of fuel takes place.

When a fuel undergoes combustion, the products obtained depend on the amount of oxygen available for combustion. If there is enough oxygen to support combustion or burning process, the combustion is called complete combustion. For example, methane on complete burning in sufficient oxygen gives carbon dioxide, water and energy.

Methane (CH₄) + Oxygen (O₂) $\xrightarrow{\text{f}}$ Carbon dioxide (CO₂) + Water (H₂O) + Energy

A simple example can be seen in the combustion of hydrogen and oxygen, which is a commonly used reaction in rocket engines. The result is water vapour.

Hydrogen (H₂) + Oxygen (O₂) $\xrightarrow{\text{f}}$ Water vapour (H₂O) + Energy

If there is insufficient oxygen to support combustion or burning process, the combustion is called incomplete combustion. When methane is allowed to burn in insufficient oxygen, the products obtained are carbon monoxide, water and energy.

Methane (CH₄) + Oxygen (O₂) $\xrightarrow{\text{f}}$ Carbon monoxide (CO) + Water (H₂O) + Energy

C. Long answer questions :

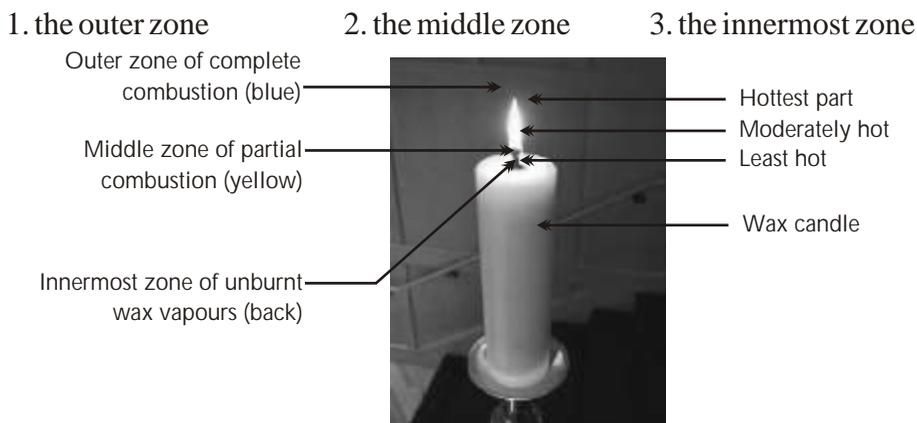
Ans. 1. Carbon dioxide gas is not a supporter of combustion. Carbon dioxide being heavier than oxygen envelops the fire and cuts off the supply of oxygen. The fire, thus, extinguishes in absence of the supporter of combustion. Generally, carbon dioxide also does not harm the electrical appliances.

CO₂ can be stored at high pressure as a liquid in cylinders just as LPG is stored in cylinders. When CO₂ is released from the cylinders, it expands a lot and envelops the fire besides also bringing down the temperature of the fire. This is the reason CO₂ is widely used as a fire extinguisher.

2. **A good fuel is one :**

- That is easily available and cheap.
- That burns easily in air at a moderate rate.
- That produces a large amount of heat.
- That does not produce any poisonous and irritating fumes during burning.
- That leaves no ash on burning.
- Whose ignition temperature is above room temperature.

3. There are three zones of a candle flame.



The candle flame

- (i) **The innermost zone :** It appears black and is the dark zone of a candle. No combustion occurs here because of lack of oxygen. It contains unburnt wax and is the least hot region of the candle flame.
 - (ii) **The middle zone :** Partial combustion takes place here and wax vapours start burning with a yellowish flame. This region of the candle flame is moderately hot. It is also known as the luminous zone.
 - (iii) **The outer zone :** This is the region of complete combustion of wax vapours, with a blue colour flame. The wax burns here completely and produces carbon dioxide, water vapour and heat. This region is the hottest part of the candle flame.
4. All carbon-containing fuels, such as wood, coal, petrol, diesel, kerosene, LPG, when burnt, produce gases like carbon monoxide, carbon dioxide, oxides of nitrogen and oxides of sulphur. In addition to these gases, generally in most solid fuels, smoke is also produced. These gaseous products and unburnt carbon particles cause air-pollution. The solid fuels, such as wood, coal, after burning also leave behind ash. This ash, if not disposed off properly, may cause air and water pollution. Pollutants in the air cause many diseases and reactions in human beings. Effects of the various pollutants on human beings are summarized below :

Air pollutant	Effects
1. Dust	Allergic reactions
2. Smoke	Respiratory problems
3. Carbon monoxide	Respiratory problems, may even lead to death
4. Carbon dioxide (excess)	Greenhouse effect : atmospheric temperature rises
5. Oxides of sulphur	Damage lungs, produce acid rain and cause corrosion
6. Oxides of nitrogen	Lung congestion, produce smog

5. There are four types of combustion :
- Rapid combustion** : Combustion that takes place at a very fast rate is called rapid combustion. In this type of combustion, both heat and light are released.
Examples :
 - Burning of LPG
 - Burning of petrol
 - Burning of dry grass
 - Burning of a matchstick
 - Burning of a magnesium ribbon or wire.
 - Slow combustion** : Combustion that takes place at a slow rate with steady production of heat is called slow combustion.
Examples :
 - Rusting of iron
 - Bright shining surface of copper becoming dull
 - Spontaneous combustion** : Combustion that occurs without the aid of any external heat is known as spontaneous combustion.
Examples : Sodium and white phosphorus catch fire without any external heat. These substances undergo slow oxidation by air and during this process heat is evolved. This heat accumulates in the substance till its ignition temperature is attained. At this point, it burns spontaneously.
 - Explosion** : Sometimes, a large volume of gas is liberated in combustion besides the production of heat and light. The sudden evolution of large quantities of gas creates excessive pressure that produces a loud noise. Such combustion is known as an explosion. Bursting of crackers is the best example of explosion. The same type of combustion is used for exploding rocks and mountains for making roads, and the explosive used is dynamite.

D. Higher Order Thinking Skills (HOTS) :

- Ans.** 1. Carbon monoxide is more dangerous than carbon dioxide as it contains higher amount of carbon particles which harm our respiratory system.
2. Dried grass catches fire easily as its ignition temperature is much lower compared to that of green and fresh grass.



Exercises

Section I

A. Select and tick (3) the correct option :

- Ans.** 1. a. 2. a. 3. b. 4. c.

B. Fill in the blanks :

- Ans.** 1. **Overuse** or **wastage** of resources must be avoided.

2. Increase in population has led to large scale cutting of **trees**.
3. Dependence on **wood** as a fuel should be reduced.
4. **Red Data Book** lists rare species and those in danger of extinction.
5. Chipko Movement was started in a village in the **Himalayas**.

C. Write true or false :

Ans. 1. true 2. false 3. true 4. false 5. true

Section II

A. Very short answer questions :

- Ans.**
1. The wise and judicious use of natural resources is called conservation.
 2. Biodiversity help to regulate climate, rainfall and wind.
 3. Removal of top layer of the soil exposes the lower hard and rocky layers and over a period of time, fertile soil gets converted into a desert. It is called desertification.
 4. The large number of plants living in a particular area are called the flora of a place.
The large number of animals living in a particular area are called the fauna of a place.
 5. Migration is seasonal movement of animals from one habitat to another because of climate changes.

B. Short answer questions :

- Ans.**
1. Following are the two aims of conservation.
 - (i) To ensure a continuous availability of useful plants, animals and materials for future generations.
 - (ii) To preserve the quality of our environment.
 2. The term **flora** is used to indicate the different plants growing in a particular area. The animals found in that area form the **fauna**. For example, let us assume that the following living organisms are present in a particular area : mango, jamun, sunflower, pea, cow, elephant, dog, crow and bull.
Flora of the given particular area is represented by mango, Jamun, sunflower and pea plants, while cow, elephant, dog, crow and bull constitute the fauna of that area.
 3. The human activities such as cultivation of land and building of settlements (houses) are not allowed in a wildlife sanctuary. Poaching (hunting) is strictly prohibited.
 4. The factors responsible for habitat destruction are :
Deforestation, industrialisation, construction of dams and natural disasters such as earthquakes, floods, droughts and cyclones.
 5. National parks, wildlife sanctuaries and biosphere reserves are the protected areas established under the Wildlife Protection Act (1972).

C. Long answer questions :

- Ans.**
1. Plants and animals are important to each other, to human beings as well as to the environment in which they live. All the components of our

environment maintain an ecological balance. Different organisms are dependent on each other directly or indirectly.

Plants are a source of food (cereals, vegetables, pulses, fruits, nuts, oils, tea, coffee and spices), medicines, fodder, fibres, timber, fertilizers, rubber, etc. Animals provide a number of products such as meat, fish, egg, milk, honey, ivory and silk.

Biodiversity is also important in the following ways :

- Help to regulate climate, rainfall and wind
 - Purify air and water
 - Help in cycling of nutrients
 - Help to preserve fertile soil
 - Form food chains and foodwebs; thereby maintaining a balance in the availability of food to all life forms.
2. Due to deforestation, soil erosion takes place due to wind and moving water. Loss of top soil will reduce the fertility of the soil as it is rich in humus and nutrients.

That is how deforestation causes desertification.

3. Red Data Book is a catalogue which lists rare species and those in danger of extinction.

The nine categories in the IUCN Red List of threatened species are given below :

- Extinct
 - Least concern
 - Endangered
 - Nearly threatened
 - Critically endangered
 - Not evaluated
 - Extinct in the wild
 - Data deficient
 - Vulnerable
4. Wildlife sanctuaries are areas reserved for the protection of animals only. Killing (poaching) and capturing of animals strictly prohibited. Three wildlife sanctuaries along with their states are :
- a. Sanjay Gandhi Wildlife Sanctuary (maharashtra)
 - b. Mudiumalai Wildlife Sanctuary (Tamil Nadu)
 - c. Dandeli Wildlife Sanctuary (Karnataka)

D. Higher Order Thinking Skills (HOTS) :

- Ans.** 1. a. Endemic species b. Endangered species c. Tiger d. Extinct species e. Dinosaur
2. a. Yak; Kashmir stag; snow leopard b. Black buck; Kashmir stag; Lion toiled macaque; Snow leopard c. Dodo; Dinosaur



8

Cell-Structure and Functions



Exercises

Section I

A. Select and tick (3) the correct option :

- Ans.** 1. b. 2. a. 3. b. 4. c.

B. Fill in the blanks :

- Ans.** 1. Discovery of cell is linked with the invention of **microscope**.
2. Most **plants** and **animals** are multicellular organisms.
3. A **tissue** is a group of cells performing similar functions.
4. Nucleus is surrounded by a thin membrane called the **nuclear membrane**.
5. The nucleus in **bacteria** is not well organised.

C. Write true or false :

- Ans.** 1. true 2. true 3. false 4. false 5. true

Section II

A. Very short answer questions :

- Ans.** 1. Cell is a structural and functional unit of life.
2. Cell wall is an additional covering around the cell membrane in plant cells.
3. The various parts of a nucleus are :
 - Nuclear membrane
 - Nucleoplasm
 - Nucleolus
 - Chromosome
4. Golgibodies synthesize, store and secrete many substances.
5. Bacteria and blue green algae

B. Short answer questions :

- Ans.** 1. The cells were discovered by Robert Hooke in 1665 when he observed a thin slice of cork under his microscope. He noticed that the cork has large number of small compartments or boxes joined together to form a honeycomb-like structure. Hooke called these little boxes cells.
2. Some cell organelles found in an animal or plant cell are given below :
 - **Lysosomes** are present in animal cells and help in cellular digestion.
 - **Centrosomes** are present only in animal cells. Centrosomes play a role in the reproduction of cells.
 - **Plastids** occur in plant cells only.
3. The structure of nucleus differs in bacteria and other organisms. In bacteria, the nucleus is not well organized. The nuclear material is not surrounded by a nuclear membrane. Such cells which lack a nuclear membrane are called prokaryotic cells. The organisms with prokaryotic cells are called prokaryotes. Bacteria and blue-green algae are prokaryotes. All organisms other than bacteria and blue-green algae have a well organized nucleus with a nuclear membrane. These organisms are called eukaryotes and the cells as eukaryotic.
4. The different kind of plastids are as follows :
 - **Chloroplasts** are green due to the presence of chlorophyll. These help in the synthesis of food by photosynthesis.
 - **Leucoplasts** are colourless plastids. Leucoplasts help in the storage of food.
 - **Chromoplasts** are coloured (e.g., red, yellow) plastids. These are responsible for the colour of flowers, fruits (tomatoes, carrots etc.)

C. Long answer questions :

Ans. 1. Cells greatly vary in size, shape and number :

Size : Cells exist in a variety of sizes. Most cells are so small that many thousands may fit on the head of a pin. However, not all cells are small. Eggs of birds are single-celled. The largest cell is the egg of an ostrich. The cell size has no relation with the size of the body of an organism.

Spape : According to the functions they perform, cells assume different shapes.

For example, nerve cells help to carry messages in the body. These cells are long and have a branched head. Nerve cells are the longest cells in our body-they may be more than a metre long. Muscle cells are cylindrical or spindle-shaped. The white blood cells present in our blood can change their shape. This helps them to kill germs by engulfing them. Amoeba can also change its shape with the help of projections on its body, known as pseudopodia. The pseudopodia (singular : pseudopodium) help the Amoeba to capture its food and move from one place to another.

Number : The bodies of organisms may consist of one or many cells. Organisms whose body consists of a single celled are called unicellular organisms. Examples of unicellular organisms are Amoeba, paramecium, euglena and bacteria. In a unicellular organism, the single cell performs all the necessary functions like feeding, digestion of food, respiration, excretion, movement and reproduction.

There are some organisms consisting from a few cells to billion cells. These organisms are called multicellular. Most plants and animals are multicellular organisms. Human body has trillions of cells (thousand billion).

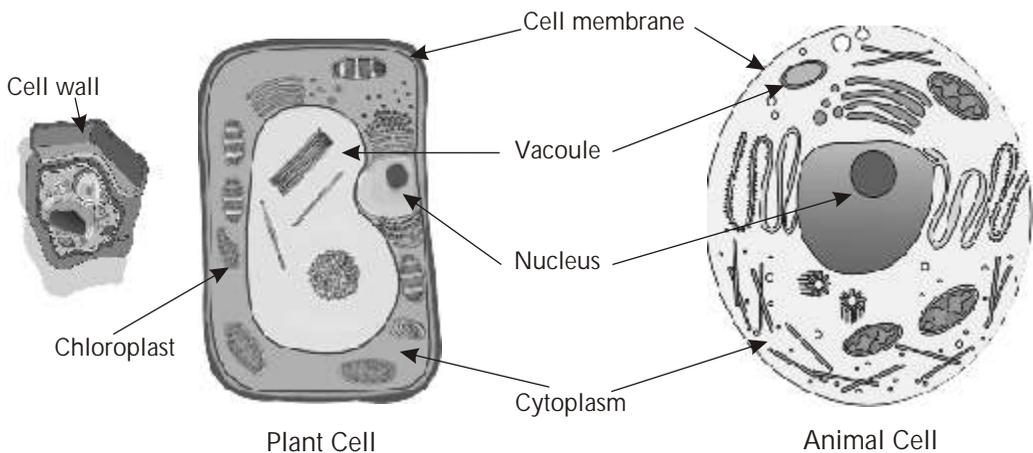
2. Nucleus is the most important component of the cell, being considered its brain. It is a small, spherical or oval shaped body floating within the cytoplasm and located in the centre of the cell. It is surrounded by a thin membrane called the nuclear membrane. The nuclear membrane like the cell membrane is also porous and allows the movement of materials between the cytoplasm and the inside of the nucleus. The fluid present inside the nuclear membrane is called nucleoplasm. Present inside the nucleus is a small spherical body called nucleolus, which can be seen with a microscope of higher magnification.

Nucleus plays an important role in :

- Cell division
- Transmission of hereditary characters from one generation to another
- Controlling all the life functions taking place in the cells

3. Chromosomes are thread like structures that are present in the nucleolus. They carry genes which help in inheritance or transfer of characters from parents to the off springs.

4. a. **Cell Membrane** : It is the outer covering of the cell. The cytoplasm and the nucleus are enclosed within the cell membrane. It is semi-permeable in nature i.e. selected materials can enter or leave the cell. Cell membrane is also known as plasma membrane. It separates the cells from one another and also the cells from the surrounding medium. It provides protection to the internal cell organelles, besides providing shape and rigidity to the cells.
- b. **Cytoplasm** is a transparent, jelly-like material which fills the cell between nucleus and cell membrane. Cytoplasm is a kind of chemical factory of the cell. Here, new substances are built from materials taken into the cell, and energy is released and stored. In fact, most of the chemical reactions which keep the cell alive take place in the cytoplasm.
5. Although plant and animal cells have the same basic structure, there are certain differences between them.



Plant cell		Animal Cell	
1.	Cell wall is present.	1.	Cell wall is absent.
2.	Cell membrane is present.	2.	Cell membrane is present.
3.	Central vacuole is present.	3.	Large number of vacuoles smaller in size are present.
4.	Plastids are usually present.	4.	Plastids are absent.
5.	Lysosomes are absent.	5.	Lysosomes are present.
6.	Centrosomes are absent.	6.	Centrosomes are present.

D. Higher Order Thinking Skills (HOTS) :

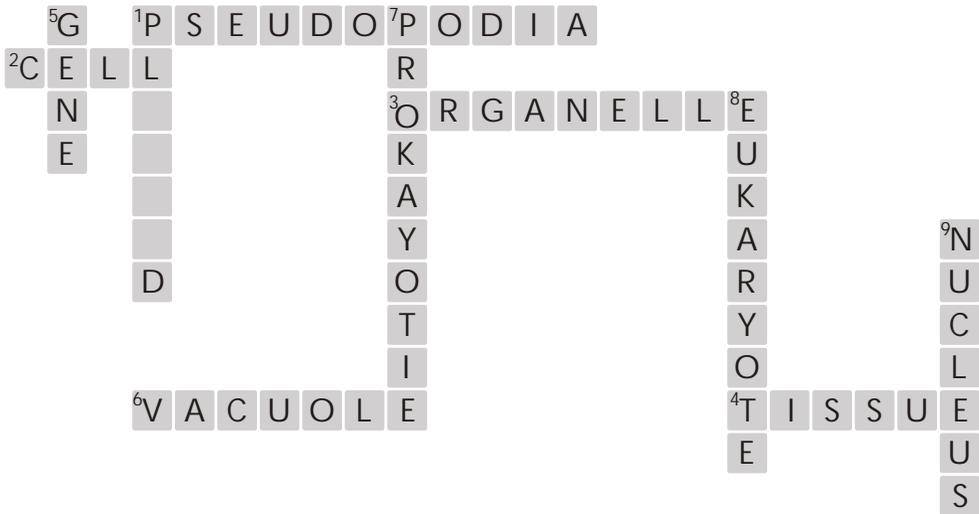
- Ans.**
1. Chloroplasts are found only in plants and not in animals because plants need them to make their own food.
 2. The slide with a cell wall was that of a plant. This is so because animal cells do not contain cell wall.

Tasks For You

Do and Learn

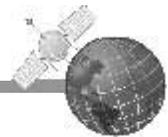
Solve the crossword

Ans.



9

Reproduction and Life Cycle



Exercises

Section I

A. Select and tick (3) the correct option :

Ans. 1. d. 2. b. 3. a. 4. b.

B. Fill in the blanks :

- Ans. 1. **Zygote** develops into a new individual.
2. The method of reproduction through the fusion of male and female gametes is called **sexual reproduction**.
3. **Foetus** is the stage of embryo in which all the **body parts can be identified**.
4. The process of formation of an offspring from a zygote is known as **development**.
5. The technique of **cloning** requires two inds of cells.

C. Write true or false :

Ans. 1. true 2. false 3. true 4. false 5. true

Section II

A. Very short answer questions :

- Ans. 1. Reproduction is the process by which living organisms produce young ones of their own kind.
2. Zygote is the fusion product of two gametes which develops into a new individual.

3. The male reproductive organs consist of a pair of testes (singular testis), two sperm ducts and a penis.
4. Development is the process of formation of an offspring from a zygote.
5. Birds, lizard, butterflies, hen, crow are some oviparous animals.

B. Short answer questions :

Ans. 1. Living beings reproduce to produce young ones that resemble them. It helps them to continue their life forms.

2. **Asexual Reproduction :** In this type of reproduction, only a single parent is involved. It takes place when there is plenty of food available and conditions are good. Organisms such as Amoeba, hydra, yeasts, starfish, sponges, and worms reproduce asexually.

Sexual Reproduction : This method involves two parents, the male and the female. Most of the plants and animals including human beings reproduce sexually. In this method, male and female gametes (reproductive cells) fuse together to form a fertilized eggs called zygote which develops into a new individual.

3. Fertilisation is the process of fusion of a male gamete and a female gamete to form a zygote. Life of every sexually reproducing organism begins as a single-celled zygote. The zygote undergoes cellular division and develops into an embryo. The embryo eventually develops into a new individual.
4. The fertilization that take place outside the body is called external fertilization. For example, frog and fish undergoes external fertilization.
5. In Amoeba, the nucleus divides into two nuclei. The body then divides into two parts, each part receiving a nucleus. Further stretching of the body leads to the formation of two daughter cells. Thus, two amoeba are produced from a single Amoeba.

C. Long answer questions :

Ans. 1. Human beings are the most complex animals. They have a complex mechanism of reproduction. The male and the female parents have permanent and separate sex organs. The male sex organ produces the male gamete called the sperm, and the female sex organ produces the female gamete called the egg or ovum. The sperm and the ovum fuse to form a fertilized egg called the zygote. The process of fusion of the sperm and the ovum is called fertilization. The zygote then goes through specific changes and finally develops into a new individual. The method of reproduction through the fusion of male and female gametes is called sexual reproduction.

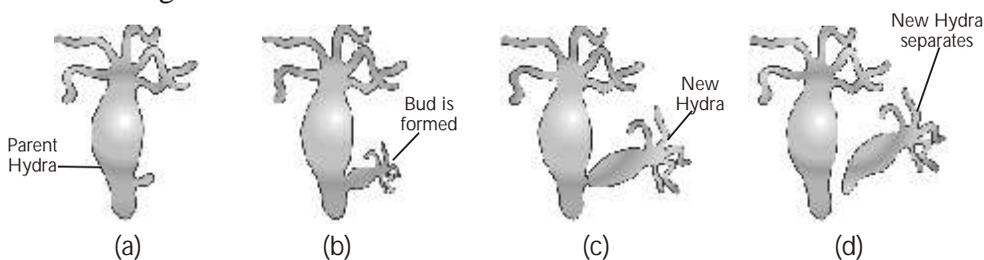
2. The male parent produces male gametes (male sex cells) called sperms in his testes each day. The female parent produces the female gametes (female sex cells) called ova (or eggs) in her ovaries. Each ovum is a round structure, of the size of a pin's head. It is many times larger than a

sperm, having a lot of cytoplasm. One ovum or an egg cell is released from one of the ovaries approximately every 28 days.

The sperms (or male gametes) in the testes of a man are introduced into the vagina to the woman through penis during copulation (or mating). In this way, millions of sperms are released into the vagina at one time. The sperms are motile, so these come up through cervix into the uterus and then pass into the oviducts. The oviduct contains an ovum or egg cell released by the ovary during ovulation. Only one sperm fuses with the ovum (or egg) in the oviduct. The sperm nucleus and the egg nucleus fuse together. This fusion of a male gamete and a female gamete is called fertilization.

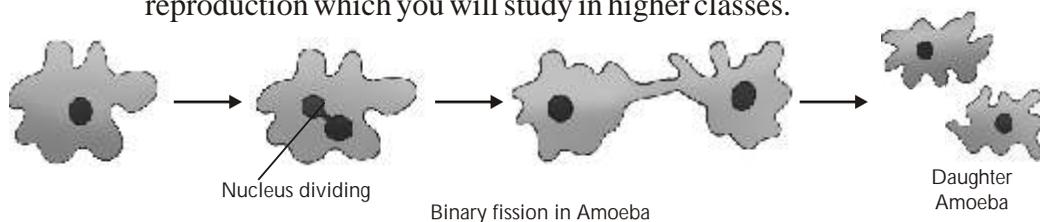
3. Asexual reproduction only involves a single parent to produce new individuals. Since only one parent is involved, the offspring is similar to the parent. The following are two very common methods of asexual reproduction.

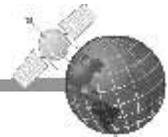
Budding : Under normal conditions the body of Hydra develops one or two bulges called buds. These buds gradually grow and after some time get detached from the parent body. Each bud develops into an adult similar to that of the parent. This type of asexual reproduction is called budding.



Hydra reproducing by the method of budding

Binary Fission : This kind of reproduction is mostly seen in Amoeba. Amoeba is a single-celled organism containing a nucleus. The process of fission starts by the division of nucleus into two. This is followed by the division of cytoplasm. Each daughter Amoeba receives a nucleus each. Thus two daughter Amoeba are produced from one parent Amoeba. Multiple fission and regeneration are some other methods of asexual reproduction which you will study in higher classes.





Exercises

Section I

A. Select and tick (3) the correct option :

Ans. 1. b. 2. d. 3. c. 4. b.

B. Fill in the blanks :

- Ans. 1. During childhood, children grow **intellectually, emotionally and socially**.
2. Appearing of **adam's apple** marks the end of adolescence.
3. The stoppage of **menstruation** is called menopause.
4. **Iodine** is required in the production of thyroxine.
5. Personal **hygiene** is very important during adolescence.

C. Write true or false :

Ans. 1. true 2. true 3. false 4. false

Section II

A. Very short answer questions :

- Ans. 1. The stage of growth from birth to about 2 years of age is called infancy.
2. Voice box is protruding structure in males that is after referred to as Adam's apple.
3. Adolescence usually starts from the age of 11 years and lasts upto the age of about 18-19 years.
4. Testosterone and estrogen are the two sex hormones, which bring about changes in boys and girls respectively during puberty. Testosterone is produced by testes in males, and estrogen by ovaries in females.
5. Pituitary Gland is referred to as the master gland.

B. Short answer questions :

- Ans. 1. Menarche is the first menstrual flow that begins at puberty. It marks the beginning of the menstrual cycle.
2. At puberty, the voice box or larynx begins to grow. In boys, it protrudes out in the throat region as Adam's apple. Appearance of Adam's apple marks the end of adolescence.
3. Males and females can be differentiated on the basis of the sex organs which are present right from birth. During puberty, other differences also start developing. The characters which develop during puberty and help to distinguish a male from a female are called secondary sexual characters.
4. When an ova is released from the ovary, the lining of the uterus becomes thicker, so as to receive the egg. If the egg is not fertilised, the lining of the uterus along with the egg and the blood vessels are shed off. Thus is known as menstruation or periods.
5. Each cell of a male has one X and one Y chromosome.

C. Long answer questions :

Ans. 1. The endocrine system consist of several glands. These glands are located at specific places inside our body. These glands release hormones which travel inside our body and reach a particular body part such as a cell, tissue or organ through the blood stream. The particular body part is called the target site. The target site then responds to the hormone. The sex hormones are under the control of hormones from the pituitary gland.

(i) Hormone ?? hormone secreted ?? Hormone reaches the producing cell in the blood target site and acts.
How hormones act ?

(ii) Hormones from the ?? Hormone reaches the ?? They stimulate pituitary stimulate target site through changes in the the testes and ovaries the blood stream body at onset to release testosterone and estrogen of puberty

2. In females, the reproductive phase begins at the time of puberty and continues to about 45-50 years. Every month, each ovary releases ovum in the fallopian tube. This is called ovulation. If the ovum gets fertilised by sperm, a single-celled zygote is formed. However, if the ovum does not get fertilised, the ovum (or the egg) and the lining of the uterus shed as blood through vagina. This bleeding happens for 4-6 days and is called menstruation or more commonly periods. The first menstruation that happens after attaining puberty is called menarche. This series of steps involving ovulation and menstruation is called menstrual cycle. It occurs once in a month.

It may vary from person-to-person. Every female experiences menstrual cycle until the age of 50 years, after which they go through menopause. Menopause is the end of the reproductive phase of the females.

3. Secondary sexual characters in males :

- Development of facial hair in the form of moustache and beard.
- Development of hair under the armpits, on the chest and in the pubic region.
- Voice becomes deeper as the voice box enlarges.
- Shoulders become broader.
- Body becomes muscular.

Secondary sexual characters in females :

- Development of breasts.
- Development of hair under the armpits and in the pubic region.
- Development of curves in the body.
- Beginning of the menstrual cycle.

4. Because of rapid physical and mental growth during adolescence, the nutritional requirements of the body increase tremendously. It is,

therefore, very important to eat a balanced diet during these growing years. This helps the bones, muscles and other parts of the body get adequate nourishment for growth.

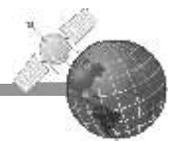
A balanced diet means a diet that contain the nutrients carbohydrates, proteins, fats, vitamins and minerals in requisite proportions. Milk, green leafy vegetables, fruits, nuts and meat are good foodstuffs for adolescents. Girls start menstruating at this stage. It is, therefore, important for them to have food rich in iron and calcium.

D. Higher Order Thinking Skills (HOTS) :

- Ans.** 1. Adolescent girls should have an iron rich diet to compensate the blood loss during menstruation.
2. This is so because junk food doesn't provide nutrient to body.



11 Force and Pressure



Exercises

Section I

A. Select and tick (3) the correct option :

- Ans.** 1. c. 2. b. 3. b. 4. d.

B. Fill in the blanks :

- Ans.** 1. The direction in which a body is pushed or called the **direction of force**.
2. Force can change the **shape** of an object.
3. **Gravitational** force exists everywhere in the universe.
4. The force acting on a unit area of a surface is known as **pressure**.
5. **Atmospheric pressure** is defined as the pressure exerted on an object by the weight of the air above it.

C. Write true or false :

- Ans.** 1. true 2. false 3. false 4. true 5. true

Section II

A. Very short answer questions :

- Ans.** 1. Force is any push or pull which moves a thing.
2. • Force can make a moving object stop.
• Force can change the direction of a still or a moving object.
3. Newton is the SI unit of force.
4. Spring balance is an example of an elastic force.
5. Iron, cobalt and aluminium.

B. Short answer questions :

- Ans.** 1. Rolling of chapatti, and breaking down of bricks
2. Four key effects a force can produce are as follows.
(i) It can make a moving object stop.

- (ii) It can change the direction of a still or a moving object.
 - (iii) It can change the speed of a moving object.
 - (iv) It can change the shape of an object.
3. a. **Contact force** : The force that can act on objects by direct or physical contact are called contact forces. Muscular force, and friction are examples of contact forces.
 - b. **Non-contact force** : The force which can be exerted from a distance without touching the object is called non-contact force. Magnetic force, electrostatic force and gravitational force are examples of non-contact force.
 4. When a rubber band is stretched, it increases in length.
 5. Friction is useful in walking and writing on a blackboard.

C. Long answer questions :

Ans. 1. The different effects of force are as follows :

It can make a moving object stop : While catching a ball thrown by your friend, you apply a push and the moving ball comes to a stop.

It can change the direction of a still or a moving object

- You apply a push to an almirah to make it face a different direction.
- A football player kicks (pushes) a football to make it move in a difference direction, over to another player of his team.

It can change the speed of a moving object

- You must have made someone push your swing to increase the speed while you sat on it.
- An elder child may stand opposite and apply a push to a tricycle being run by a younger child and slow it down.

It can change the shape of an object

- Every day, your mother rolls down a ball of kneaded flour into a chapati (different shape) by applying a push. You might have played with moulding clay of different colours, making it into so many different shapes of fruits, animals, etc. Here also, a push is applied by you.
 - You might have seen labourers breaking down bricks or stones into smaller pieces, by hitting them with a hammer. Again, the shape of the bricks or stones is getting changed due to a push (hitting).
2. For this do the following activity :

Take a tin can or a plastic bottle. Drill a few holes all around it near the bottom. The holes must be at the same height from the bottom. Fill the bottle with water. What do you observe?

Water rushes out from all the holes and falls at the same distance from the can.

This shows that liquids exert equal pressure in all directions at the same depth.



Liquids exert equal pressure at the same depth

3. a. **Muscular force** : When we lift a bucket of water or push a cart, kick a ball or walk or run we use muscular force. Digestion of food, bending of our body, breathing; are all carried out due to the force exerted by the muscles.

Similarly, animals like bullocks, horses, donkeys and camels also use muscular force to do heavy work such as pulling a cart or a tonga, ploughing, carrying heavy load, etc.

- b. **Gravitational force** : The force acting between any two books, between a book and a table, between you and your friend, between Earth and the moon etc., is gravitational force.

Gravitational force exists everywhere in the universe.

Earth has a huge mass. So it attracts every object towards it. That is why a ball thrown upwards ultimately comes down, a ripened fruit falling from a tree falls down to the earth.

- c. **Friction force** : Friction is also a type of contact force. The force acting between two surfaces in contact with each other which opposes the motion of one body over the other, is called friction or force of friction. The force of friction always acts on all moving objects and its direction is always opposite to the direction of motion.

- d. **Electrostatic force** : Rub a plastic pen or comb into your dry hair and then hold it near some tiny pieces of paper. What happens? The tiny pieces of paper get attracted towards the plastic pen or comb.



The tiny pieces of paper get attracted due to the force exerted by the electrostatic charge on the pen or comb.

4. We can show this with the help of following experiment :
- Take a balloon. Inflate it. Leave the mouth open. What happens? The air moves out and the balloon deflates.
 - Take a balloon, prick it with a needle to make holes. Can you fill air in it? The answer is No.

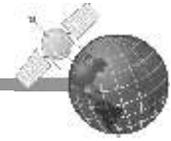
The above activity shows that air exerts pressure in all directions and also on the walls of the container.

D. Higher Order Thinking Skills (HOTS) :

- Ans. 1. This is so because the pressure of water is at the greatest at the depth of the dam. Thicker walls make it possible to withstand the pressure.
2. A person wearing a pointed heel will hurt more. That is so because due to less content area, pressure will increase manifold.
3. Broader straps increase the contact area, there're spread the pressure, making it more comfortable.



12 Friction



Exercises

Section I

A. Select and tick (3) the correct option :

Ans. 1. c. 2. d. 3. a. 4. a.

B. Fill in the blanks :

- Ans. 1. **Friction** resists the relative motion of two surfaces in contact.
2. Friction is caused due to **interlocking of irregularities** in the two surfaces.
3. The force of friction depends on the **nature** of the surfaces in contact.
4. When a body is at rest, the force of friction is called the **static** friction.
5. **Soap** solution also acts as a lubricant.

C. Write true or false :

Ans. 1. true 2. true 3. false 4. true 5. false

Section II

A. Very short answer questions :

- Ans. 1. Friction is a natural force that resists the relative motion of two surface in contact. It is always exerted in a direction that opposes motion.
2. We rub our hands against each other to warm them up in chilled winter morning. This shows that friction can produce heat energy.
3. Static friction is the force of friction between two surfaces which balances the force applied on the object to push it.
4. When an object (like a wheel) rolls over the surface of another object, the resistance to its motion is called rolling friction.
5. Tyres of automobiles have treads which provide a better grip with the ground.

B. Short answer questions :

- Ans. 1. Interlocking of irregularities in the two surfaces in contact causes friction.
2. When an external force is applied to start a relative motion, the interlocking of surfaces gets off thus, causing less frictional force. That is why once the motion starts the frictional force acting between the surfaces in contact decreases, so that a smaller force is required to maintain a uniform motion. That is why sliding friction is less than the static friction.
3. Streamlining means a properly shaped body that can easily move through air or water. Streamlined shape minimises the friction between the object and the medium in which it is moving.
4. The force of friction depends on the nature of the surfaces in contact. This is because rough surfaces are more irregular than smooth surfaces. So, the force of friction is greater in rough surfaces than in smooth.
5. Friction is a necessary evil as we can walk, write or drive only because of

friction. We cannot walk or write on a highly smooth surface. The friction between two surfaces help us to do so.

C. Long answer questions :

Ans. 1. Some of such examples are as follows :

- You rub your hands against each other to warm them up in chilled winter mornings.
- To light a matchstick, you rub its head on the rough side of the matchbox. By doing this, some heat is generated and the combustible material on the head of the matchstick starts burning.
- When wind blows through a tree, the tree impedes the flow of the wind. This causes the wind to slow down. Friction takes away some energy from the wind and transforms it into noise of leaves and branches as the wind blows, through them.

2. **Rolling Friction** : The force of friction that exists between two surfaces when a body rolls over the other body is called rolling friction.

Rolling reduces friction. That is why it is easy to move a heavy box when it is fitted with wheels. We will need to apply a lot of force, if it is without wheels.

Sliding Friction : The force of friction acting between two bodies when they slide on one another with a uniform speed is called sliding friction.

When an object starts sliding, the contact points on its surface do not get enough time to lock into the contact points on the floor. So sliding friction is slightly smaller than static friction.

3. Some advantages of friction are as follows :

- We are able to walk, run, play, etc., due to friction between the ground and the soles of our footwears. This is the reason why patterns or grooves are made on the soles of shoes to increase friction. This prevents the person from slipping.
- Can you now guess why it is easier to write on a plain paper than on a glazed/waxed paper?
- It is due to friction between the road and the surface of tyre that you are able to drive safely. If there was no friction, automobiles could not be started or stopped or turned to change direction of motion.
- You are able to tie a knot or fix a nail on the wall due to friction.
- Without friction you will not be able to sit on a chair or write, or construct a building.
- You will also not be able to hold on to things. If a vessel is greasy or has a film of oil on it, it is difficult to hold it.

4. The friction between two surfaces can be reduced by the following methods.

- i. **By polishing the surfaces** : Rough surfaces can be made smooth by polishing. Polishing removes 'hills' and 'valleys' from the surfaces. Therefore, polishing of the surfaces reduces the friction.

- ii. **By applying oil or grease on the surfaces (or by lubrication) :** Oil/grease forms a thin layer between the two surfaces. Thus, a lubricant (oil/grease) separates the two surfaces. This reduces the chances of interlocking of the two surfaces and thus reduces the friction.
Soap solution also acts as a lubricant. That is why we tend to slip on the floor if it is covered with soap solution.
- iii. **By sprinkling a soft, slippery fine powder on the surfaces :** A small quantity of fine powder on a wooden surface or floor etc., reduces friction. That is why a small quantity of talcum powder is applied on carrom board. Graphite powder is used in machines to reduce friction.
- iv. **By using wheels, ball-bearings or roller-bearings :** When a body rolls over a surface, the force of friction is much lesser than that on a flat surface. That is why, friction is being reduced by using wheels, ball-bearings or roller-bearings in machines.
- v. **By streamlining the body of an object :** Properly shaped bodies (called streamlined) experience less friction from air or water. Bodies of aeroplanes, rockets, ships, etc., are streamlined. Birds and fish also have streamlined bodies.

D. Higher Order Thinking Skills (HOTS) :

- Ans.** 1. Floor B offers greater friction (because it makes the moving pencil cell stop at a lesser distance of 20 cm).
2. a. Sliding friction b. Static friction c. Rolling friction



13 Sound



Exercises

Section I

A. Select and tick (3) the correct option :

- Ans.** 1. a. 2. d. 3. c. 4. b.

B. Fill in the blanks :

- Ans.** 1. **Non-living** things also make a variety of sounds.
2. The SI unit of frequency of sound is **hertz**.
3. Unpleasant sound is called **noise**.
4. Sound cannot travel through **vacuum**.

C. Write true or false :

- Ans.** 1. false 2. false 3. true 4. true

Section II

A. Very short answer questions :

- Ans.** 1. Frequency is the total number of complete vibrations by an object in one second.

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C. Long answer questions :

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The more sound waves are produced every second, the closer the compressions are. Consequently, the higher the frequency of the waves is the lower their wavelength will be.

2. Amplitude is defined as the maximum displacement of a particle from its rest position. Amplitude determines the loudness of a sound. When the amplitude of a vibrating body is high, the sound produced is loud. For example, when we strike a drum using less force, the vibration, and thus the amplitude, is less, so a soft sound is produced. When we use a greater force to strike the drum, the vibration, is more and so the amplitude, is more, and so a loud sound is produced.
3. Various sources of noise pollution and its ill effects are as follows :

Sources

- a. **Industrial Sectors** : Machinery, a basic unit of factories is the main cause of noise pollution in commercial sectors. As the machineries become old their noise pollution also increases.
- b. **Noise from Vehicles** : In addition to air pollution vehicles also cause noise pollution. Moreover when old vehicles are not maintained properly their contribution to the noise level increases manifold. Transport vehicles like truck, bus, rail, car, scooters, aeroplanes etc. all cause sound pollution. Aeroplanes flying at lower altitudes cause noise pollution.
- c. **Noise in surroundings** : In our surrounding noise is produced by loud speakers used in different functions and rallies organised by various political parties. Loud music played in cars, shouting of street hawkers, noise produced during the construction of buildings also add to the noise pollution.
- d. **Fire Crackers** : Fire crackers explode with a sharp and loud sound. These high intensity crackers are the sources of sound pollution.
- e. **Gadgets for entertainment** : Radio, tape, recorders, transistors, television etc. when played on high volumes contribute to sound pollution.
- f. **Domestic appliances** : Coolers, air conditioners, washing machines, mixer cause sound pollution.

Noise Hazards : Noise can lead to many health hazards.

- It may cause partial or permanent hearing loss.
- It increases nervous tension, irritation and high blood pressure.
- It may also cause lack of concentration in work or studies.
- Loud noise during night-time disturbs our sleep.

4. For this, do the following :

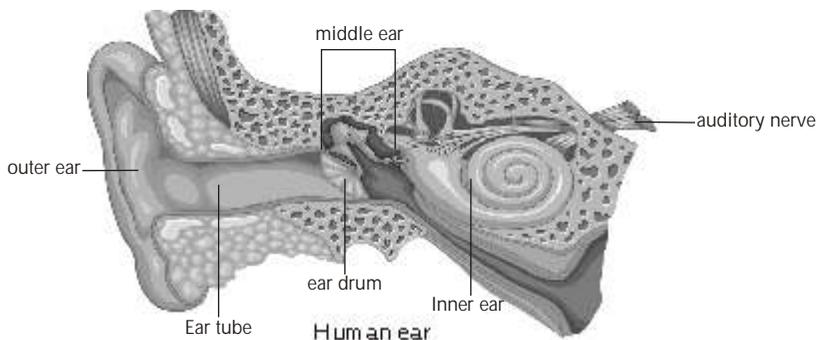
Take a clean dry glass tumbler. Place a cell phone in it. Ask someone to call on the phone. Listen to the ring carefully. Surround the rim of the tumbler with your hands. Put your mouth on the opening between



your hands. Ask your friend to call you on the cell phone again. Listen to the ring, while you suck air from the glass tumbler. Is there any difference in the volume of sound as you suck air? What happens to the sound when you remove your mouth from the tumbler?

The sound becomes fainter as you suck air. You would not hear any sound if all the air in the tumbler could be sucked. The sound needs a medium to travel. It cannot travel in vacuum. Vacuum means complete removal of air from a vessel.

5.



D. Higher Order Thinking Skills (HOTS) :

- Ans.** 1. This is because sound is carried by the waves to a greater distance and more clearly. As sound travels better in liquids than in air.
 2. Amplitude of a vibrations small, so feeble sound; Amplitude of vibrations large, so loud sound.



14

Chemical Effects of Electric Current



Exercises

Section I

A. Select and tick (3) the correct option :

Ans. 1. a. 2. c. 3. a. 4. c.

B. Fill in the blanks :

- Ans.** 1. **Conductivity** of electricity allow electric current to pass through them.
 2. An **LED** starts emitting light even when a very weak current flows through it.
 3. Distilled water does not conduct **electricity**.
 4. Cations are positively charged and anions are **negatively** charged.
 5. **Electroplating** is widely used to prevent corrosion.

C. Write true or false :

Ans. 1. true 2. false 3. true 4. true 5. true

Section II

A. Very short answer questions :

- Ans.** 1. The materials, which allow electric current to pass through them, are conductors of electricity. While, materials, which do not allow electric current to pass through them easily, are insulators.
- An LED is an electronic device. It starts emitting light even when a very weak current flows through it.
 - No, distilled water does not conduct electricity.
 - Electrolysis is a processes of producing chemical reactions in liquids by passage of electric current.
 - Electroplating is the complete process of coating a metal on another material by electrolysis process.

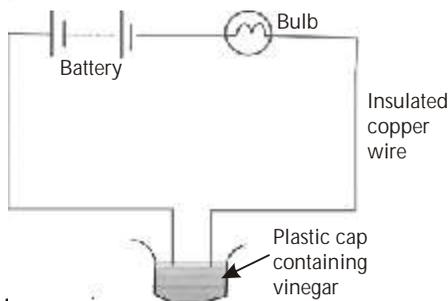
B. Short answer questions :

- Ans.** 1. Honey, distilled water and lemon juice not conduct electricity. All others conduct electricity.
- It is so because water is a good conductor and it can give the person an electric shock.
 - LED can conduct electricity even if there is a very small current is going through it.
 - The needle deflects. This happens because of the magnetic effect of electric current. The magnets there into an electromagnet due to it.
 - Distilled water is pure water with no salts added in it. Due to absence of salts, electricity can not pass through it. Tap water, on the other hand, contains small amounts of salts. These salts make it a good conductor of electricity.

C. Long answer questions :

- Ans.** 1. For this, following activity can be done :

Carry out the activity under the supervision of an adult. Take a small amount of vinegar in a plastic bottle cap and dip the two copper wires in it as shown in the figure. Ensure that the two free ends of the wire do not touch each other and are 1 cm apart.



Does the bulb glow?

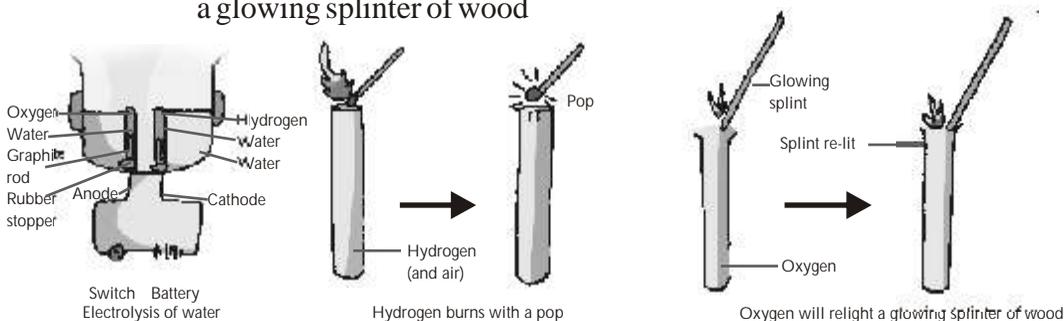
The bulb glows. This indicates that vinegar is a good conductor of electricity.

Repeat the above activity using lemon juice. Is lemon juice also a good conductor of electricity or not?

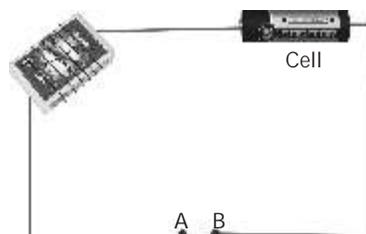
When the liquid between the two ends of the tester electric current to pass, the circuit is completed and the bulb glows. When the liquid does not conduct electricity, bulb will not glow.

- Take a plastic vessel. Drill two holes at its bottom and set rubber stoppers in these holes.
 - Insert carbon electrodes in these rubber stoppers and connect these electrodes to a 6 volt battery and a switch.

- Fill the vessel with water such that the electrodes are immersed. Add a few drops of dilute sulphuric acid to the water in the vessel.
- Take two graduated test tubes filled with water and invert them over the two carbon electrodes.
- Switch on the current.
- After sometime you will observe the formation of bubbles at both the electrodes. These bubbles displace water in the graduated tubes.
- Once the test tubes are filled with the respective gases, remove them carefully.
- Test these gases one by one by bringing a burning splinter of wood close to the mouth of test tubes.
- What happens in each case? When gas is present in each test tube?
- What do you think has happened?
- The electricity has a chemical effect on the water and has split it into oxygen and hydrogen. The volume of hydrogen gas is twice that of oxygen and so the formula for water is H_2O .
- Electrolysis of water Hydrogen burns with a pop. Oxygen will relight a glowing splinter of wood



3. Carry out the activity under the supervision of an adult. Place a magnetic compass in an empty match box tray. Wrap an electric wire round the tray a number of times. The two free ends of the wire are used to connect the other components. One end is connected to the battery. Connect the other end of the terminal of the battery to another piece of wire. Now join the two ends of the wire for a very brief period. What do you observe? The compass needle will deflect. You may repeat the activity using different liquids like tap water, milk, oil, honey, etc.
Note : Always wash and dry the ends of the tester after testing a liquid.
4. The process of depositing a thin layer of one metal on top of another metal with the help of electric current is called electroplating. When an electric current is passed through a copper sulphate solution, copper sulphate dissociates into copper and sulphate. Free copper gets



deposited on the cathode. To make up for this loss of copper in the solution, an equal amount of copper from the anode gets dissolved in the solution and this process continues. In other words, copper gets transferred from the anode to the cathode.

In electroplating, the object to be coated is made the cathode and the metal to be deposited on the object is made the anode. The solution contains dissolved salts of the metal to be deposited.

Electroplating is a common application of chemical effects of electric current.

5. Applications of electroplating in our day to day life are as follows :
- It is widely used for coating metal objects with a thin layer of different metals. For example, chromium plating is done on many objects such as kitchen gas burners, bath taps, etc.
 - Electroplating is widely used to prevent corrosion. For example, chromium has a shiny appearance and it does not corrode.
 - Jewellers electroplate silver and gold on less expensive metals.
 - Tin cans used for storing food are made by electroplating tin on iron.
 - Iron is coated with zinc to protect it from corrosion and prevent formation of rust.

Disposal of waste from electroplating factories is a major problem as it is highly polluting. It must be disposed off in accordance to the laid down guidelines.

D. Higher Order Thinking Skills (HOTS) :

- Ans. 1. He do so because water can very easily conduct electricity and it can add fuel to fire.
2. Electroplating is hazardous to the environment, as it releases small particles of metals that accumulated and creates problems.



15

Some Natural Phenomena



Exercises

Section I

A. Select and tick (3) the correct option :

- Ans. 1. c. 2. a. 3. a. 4. d.

B. Fill in the blanks :

- Ans. 1. **Atoms** are made of protons, neutrons and electrons.
2. An electrically **neutral** object can be charged by various methods.
3. The process of transferring charge from a charged object to the Earth is called **earthing**.
4. During a thunderstorm seek shelter in a vehicle with **closed** windows.
5. **Earthquakes** are also caused due to volcanic eruptions.

C. Write true or false :

- Ans. 1. false 2. true 3. true 4. false 5. true

Section II

A. Very short answer questions :

- Ans.** 1. Like charges repel each other.
2. Lightning conductor.
3. Charging by conduction.
4. The intensity of an earthquake is measured by an instrument called Richter scale.

B. Short answer questions :

- Ans.** 1. Electrical charges are atoms having either positive charge or negative charge. These conducted electricity to an uncharged body.
2. We can charge a body by friction by rubbing the two bodies against each other. This produces an equal and opposite charge in both the bodies.
3. During lightening the best shelter is a vehicle with closed windows.
4. Charging by induction means to charge a body by bringing a charged body near it, but not touching it.
5. An earthquake is a sudden movement or trembling of the Earth which lasts for a brief period. It is caused due to disturbance deep down inside the crust. Earthquakes occur all over the Earth all the time. They may range from mild tremors that are not noticed to massive ones causing wide spread destruction and damage to buildings, bridges, dams and life.

C. Long answer questions :

- Ans.** 1. An object having no electric charge on it is called an uncharged object. An uncharged object does not have any effect on other objects. An object having electric charge on it is called a charged object. A charged object attracts other uncharged objects. This point will become clear from the following example. If we take a glass rod and bring it near some tiny pieces of paper, it will not have any effect on them. If, however, the glass rod is first rubbed with a piece of silk cloth and then brought near the tiny pieces of paper, then the glass rod attracts the tiny pieces of paper towards itself. These observations can be explained by saying that initially the glass rod is electrically neutral or uncharged (having no electric charge), so it has no effect on the tiny pieces of paper. But when the glass rod is rubbed with silk cloth, then it gets electric charge. The electrically charged glass rod exerts a force on the tiny pieces of paper and hence attracts them. From this example we find that a glass rod rubbed with silk acquires the ability to attract small, uncharged pieces of paper. The objects showing this effect (of attracting other objects) are said to be electrically charged or just charged. The process of giving electric charge to an object is called charging the object.
2. (i) **Charging by conduction :** If we touch a charged object to an uncharged one, the electric charge will flow from the charged object to the uncharged one. This method of charging a body is called charging by conduction. The body being charged will acquire the

same charge as the body charging it.

(ii) **Charging by induction** : We can also charge a body by bringing a charged body near it, but not touching it. The charged body induces the same charge that it has on the uncharged body. This method of transfer of charge is called induction.

3. **Aim** : To observe whether a neutral body can be charged or not.

- Take a balloon, an eraser, a plastic scale, an ebonite rod, a glass rod and a metal rod. You can add more items to the list.
- Now rub these objects with different materials like a woollen sweater, a silk cloth, a polythene bag, dry hair, etc. and bring them close to small pieces of paper.

Note your observations below :

Nature of charge induced in a neutral body

Object	Rubbed with	Attracts/does not attract pieces of paper	Charged/neutral
Balloon	Polythene bag, dry hair, silk cloth, sweater		
Eraser	Sweater		
Plastic scale	Dry hair, sweater		
Ebonite rod	Sweater		
Glass rod	Silk cloth		
Metal rod	Poythene bag, sweater		

By the given activity we can conclude that a neutral body can be charged.

4. We can take the following precautions against the lightning :

Inside

- Stay away from doors and windows.
- Avoid being near electrical outlets, appliances or equipments.
- If the thunderstorm is present, do not plug or unplug TVs, telephones, stereos or other electrical appliances.
- `Stay away from plumbing, avoid running water and do not take a shower or bath.
- Do not use corded telephone except for emergency purposes.

Outside

- If caught outdoors, seek cover indoors as quickly as possible.
- Do not stand under a tree for cover because taller and moist objects are more prone to lightning strike.
- Seek shelter in a vehicle with closed windows.
- Do not use an umbrella, lawn mower, bicycle or similar objects.
- Avoid metal objects like fences, benches or tall poles.
- If swimming or boating, seek shelter on land as quickly as possible.

- If caught in an open field, crouch low, with your head bent in between your arms and legs close together.

D. Higher Order Thinking Skills (HOTS) :

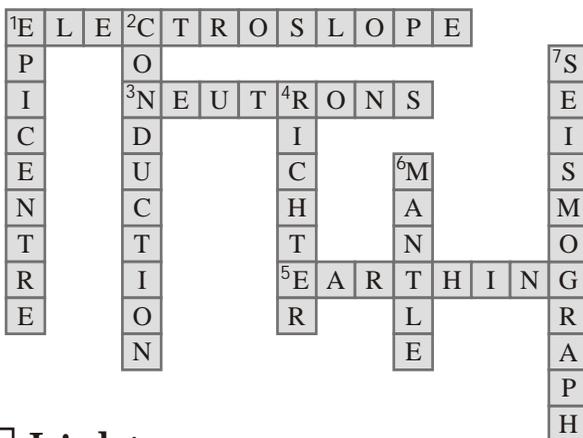
- Ans.** 1. This happens because of charging by friction.
 2. An umbrella has an iron spike. This can conduct electricity and we may get injured.

Tasks For You

Think and Tell

Complete the following diagram :

Ans.



16 Light



Exercises

Section I

A. Select and tick (3) the correct option :

- Ans.** 1. c 2. d. 3. a.

B. Fill in the blanks :

- Ans.** 1. **Reflection** is the phenomenon of bouncing back of light into the same medium.
 2. The angle between the incident ray and the normal is called the **angle of incidence**.
 3. In a plane mirror, the image is formed **behind** the mirror.
 4. **White** sunlight consists of seven colours.
 5. Deficiency of vitamin causes **night blindness**.

C. Write true or false :

- Ans.** 1. true 2. 3. 4. 5.

Section II

A. Very short answer questions :

- Ans.** 1. The incident ray, the reflected ray, and the normal at the point of incidence lie on the same plane.
 2. We call it angle of reflection.

3. Real image
4. Cornea
5. Sclera

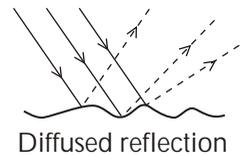
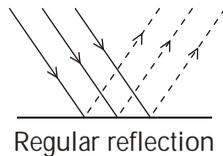
B. Short answer questions :

- Ans.**
1. Lateral inversion means that the right side of the object appears as left and the left side of the object appears right.
 2. Regular reflections and irregular reflections are two kinds of reflections :
 3. The iris increased and decreases the size of the pupil to regulate the amount of light that enters the pupil. The iris gives the distinctive colour to the eye.
 4. Myopia or short-sightedness. Such a defect is seen in young persons. In such cases, the image of the distant object falls in front of the retina. A person suffering from myopia cannot see far of objects clearly. Usually, old persons suffer from this defect. Persons suffering from long-sightedness have difficulty in reading. In this case, the image of the object falls behind the retina.
 5. When light rays appear to meet behind the mirror or screen, virtual image is formed.

C. Long answer questions :

- Ans.**
1. Reflection of light from a smooth surface is called regular reflection. The image formed is clear and sharp in this case.

When light rays fall on a rough, irregular surface, the reflected rays are not parallel, but are reflected in different directions. The image formed is not clear and sharp.

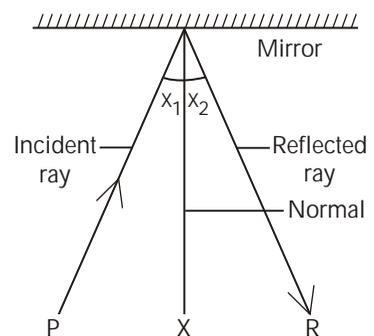


This is called irregular or diffused reflection.

2. **Angle of reflection :** The angle between the reflected ray and the normal is the angle of reflection. x_2 shows the angle of reflection for the reflected ray RO.

Angle of incidence : The angle between the incident ray and the normal is called the angle of incidence. x_1 shows the angle of incidence for the incident ray PO.

The angle of incidence is always equal to the angle of reflection.



Reflection of light

3. The entire sheet of paper spread on the table represents one plane. The incident ray, the normal at the point of incidence, and the reflected ray lie in the plane of the paper. When the paper is bent, a plane different from the plane in which the incident ray, reflected ray and normal lie is created. The reflected ray of light does not

lie in the new plane formed due to the bent sheet.

Can you tell what this indicates?

This suggests that the incident ray, the reflected ray and the normal at the point of incidence, all lie in the same plane.

Thus, the two laws of reflection are :

First law : The incident ray, the reflected ray, and the normal at the point of incidence lie on the same plane.

Second law : The angle of incidence is equal to the angle of reflection.

4. The characteristics of image formed by a plane mirror as follows :
 - (i) The image is formed behind the mirror.
 - (ii) It is a virtual image which cannot be taken on the screen.
 - (iii) The size of the image and the object is the same.
 - (iv) The image formed by the plane mirror is erect and not inverted. That is why you see yourself upright in plane mirror and not inverted.
 - (v) The image will be formed as far behind the mirror as the object is in front of it. That is why you find that when you move closer to the mirror your image also seems to move closer. Similarly, when you move away from the mirror, your image also seems to move away.
 - (vi) The image formed by a plane mirror is laterally inverted.
5. Braille is a code, which enables blind persons to read and write. A blind Frenchman, Louis Braille, invented it in 1829 and adopted in 1932. There is a Braille code for common languages, mathematics and scientific notations. Braille is comprised of a rectangular six-dot cell on its end, with up to 63 possible combinations using one or more of the six dots. Braille is embossed by hand (or with a machine) onto thick paper, and read with the fingers moving across on top of the dots. Combinations of the Braille dots within a cell represent contractions of two or more print letters and Braille characters take up three times as much space as print. This method is based upon recognition of characters by touching which are them memorised.

D. Higher Order Thinking Skills (HOTS) :

- Ans.**
1. This is so because new stainless steel utensils show regular reflection that gives a clear image.
 2. He may have suffering from long-sightedness and was feeling difficulty reading.

