

1 Crop Production and Management **Exercise****Section-I****A. Tick (✓) the correct answer (MCQs) :****Ans.** 1. c. 2. a. 3. c.**B. Fill in the blanks :**

- Ans.**
- 1.
- Kharif**
- crops are sown in rainy season.
-
2. The implement used for ploughing is called
- plough**
- .
-
- 3.
- Seeds**
- should not mixed with the seeds of weed.
-
4. The process is removing weeds from the fields is known as
- weeding**
- .
-
- 5.
- Water**
- is a key input for crop production.

C. Write true or false :**Ans.** 1. True 2. False 3. True 4. False 5. False**Section-II****A. Very Short Answer Type Questions :**

- Ans.**
1. Seeds are fertilized parts of a plant, capable of growing into new plants.
-
2. Irrigation is the act of supplying water to a field or garden through artificial means as by diverting streams, flooding or spraying.
-
3. Threshing is the process of separating the grains from the harvested plant.

B. Short Answer Type Questions :

- Ans.**
1. Crop rotation is the process of raising different crops alternatively on the same agricultural land. This is carried out keeping in mind the nutrients required by different crops.
-
2. Weeding is done either by pulling weeds out with hand or with the help of trowel (khurpa) or harrow or by using some chemicals. The chemical used very commonly is 2,4-D (2, 4-Dichlorophenoxy acetic acid). This chemical kills only the weeds and not the cultivated crops.
-
3. Pests can be controlled by using chemicals known as pesticides. Some commonly used pesticides are DDT, BHC and Malathion. They are either sprayed by hand-operated machines or by low flying aircraft, if the area to be covered is large.
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4. The seeds must be sown at a reasonable depth under the soil so that they get air, water and suitable temperature to germinate. If they are sown too deep they may suffocate without air and if they are spread on the soil, they may be eaten up by the birds.

C. Long Answer Type Questions :

- Ans.**
- 1.
- Preparation of soil**
- Preparation of soil is the first step in the process of

farming. Once a crop is harvested, the soil needs to be prepared so that it is suitable for sowing of seeds again. It involves the following processes.

Ploughing : Aeration of soil is very necessary for germination of seeds and growth of plants. Ploughing helps in loosening the soil and mixing the top soil with the soil below. The implement used for ploughing is called plough. Plough is made of wood or metal. Today tractors are used to drag a plough across the field. Ploughing helps in:

- Aerating the soil.
- Penetration of the roots of seedling.
- Improving soil drainage.
- Exposing soil pests to predators.
- Uprooting weeds.

Levelling : The ploughed soil may have large mud pieces called crumps. These are broken down with the help of soil leveler. Later using wooden levelers, soil is pressed to prevent erosion.

2. **Differences between manures and fertilisers are as follows :**

| Manures | Fertilisers |
|---|---|
| 1. They are not soluble in water. So they are not easily absorbed by the roots of the plants. | 1. They are soluble in water and are absorbed by the plants easily. |
| 2. These are organic substances. | 2. These are inorganic substances. |
| 3. They are not nutrient specific. | 3. These are nutrient specific. |
| 4. These are bulky and hence difficult to store and transport. | 4. These are in powdered form hence are not bulky and can be easily stored and transported. |
| 5. Excessive use does not harm the soil texture, they provide humus to the soil. | 5. Excessive use can change the chemical composition of the soil and also pollute water. |
| 6. They restore the soil texture and help in water retention. | 6. They may damage the soil texture and make it more porous. |

3. **Mixed Cropping :** It is the practice of growing two crops simultaneously in the field. The crops are so chosen that they benefit each other. A cereal crop like wheat is grown with a legume crop like pulses. The wheat benefits as the soil is rich in nitrogen because of the legume.
4. A lot of plants die due to some diseases and pests which attack and damage them. Generally, plant diseases are caused by fungi, bacteria, and viruses. These diseases are transmitted either through the seed itself (seed-borne) or by air (air-borne) or soil (soil-borne). Also crops can be infected by pests. Rust of wheat and Blast of rice are two common fungal diseases of

plants. To control plant diseases and pests, we can spray fungicides and pesticides on the crops or on the soil.

D. Higher Order Thinking Skills (HOTS) :

- Ans.** 1. Farmers raise seedlings in nursery to allow them grow well. It ensures proper development of them.
2. No, I do not agree with the statement. This is so because by using fertilizers than the capacity of the farm, we will destroy its crop bearing ability.

2 Microorganisms : Friend and Foe!



Exercise

Section-I

A. Tick (✓) the correct answer (MCQs) :

Ans. 1. a. 2. a. 3. a.

B. Fill in the blanks :

- Ans.** 1. The study of microorganisms is called **microbiology**.
2. Algae are simple **unicellular** or **multicellular** green plants.
3. **Viruses** are smallest and the most primitive acellular microorganisms.
4. Disease-causing microbes are called **pathogens**.
5. The food spoiled by microbes or by toxins causes **food poisoning**.

C. Write true or false :

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

D. Tick (✓) the odd-one out giving reason :

- Ans.** 1. Anaerobic bacteria, **Blue-green fungus**, Animal dung, Biogas
Reason : It is harmful for us. Rest are not.
2. Salt, Sugar, Oil, **Clostridium botulinum**, Sodium metabisulphite
Reason : It causes food poisoning. Rest are food preservatives.
3. Bacteria, Fungi, **Virus**, Algae, Protozoa
Reason : It is only harmful. Rest may also be useful.
4. Milk, Curd, **Renin**, Lactobacillus
Reason : It is a protein. Rest are associated with bacteria.

Section-II

A. Very Short Answer Type Questions :

- Ans.** 1. There are five major groups of microorganisms. These are :
(i) Bacteria (ii) Fungi (iii) Algae (iv) Protozoa (v) Viruses
2. A vaccine is injected into the body of person or an animal when it is needed to immunise the body against a particular disease.
3. All living organisms get nitrogen through plants in the form of food as pulses.

B. Short Answer Type Questions :

- Ans.** 1. Retting is a process of softening of a plant fibre by soaking it in water.
2. Microorganisms are found everywhere in land, in air and in water.
3. Viruses differ from other microorganisms such as bacteria in the sense that they are a connecting link between non-living and living things. Also all viruses are pathogenic.
4. The process by which spoilage of perishable food is prevented using chemical or physical methods is called food preservation.
5. Spoilage of food by microbes or toxins is termed as food poisoning. Food poisoning is caused by the fast multiplication of bacteria and fungi in warm and humid conditions.
6. Food preservation is the process by which spoilage of perishable foods is prevented using chemical or physical methods.

Five methods of preserving food are :

- Cooling
- Dehydration
- Using salt and sugar
- Heating and canning
- Using chemical preservatives

C. Long Answer Type Questions :

- Ans.** 1. Microbes, like bacteria and fungi, bring about the decay of dead plants and animals, both on land and in water. Without microbes the Earth would soon be covered with foul smell from dead organisms.

There would have been a shortage of carbon and nitrogen compounds which are so essential for the living organisms.

As the microbes take in food, they breakdown plant and animal tissues into simple chemical substances. These substances are then restored to the soil, water and air in forms that can be used by plants and animals.

2. Some bacteria live in the roots of leguminous plants such as pea, bean and gram. These bacteria form root nodules and are able to fix atmospheric nitrogen and convert it into suitable usable forms like nitrates.

Atmospheric nitrogen cannot be used by plants as such, but it can be used in the form of nitrates. The process of fixation of atmospheric nitrogen into suitable forms (that plants can use) is called nitrogen fixation. Nitrogen fixation increases the fertility of soil.

3. Spread of communicable diseases includes a number of methods-through air we breathe, through water we drink, through food we eat and through carriers.

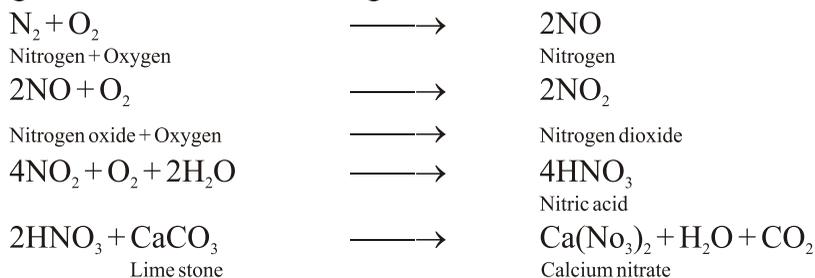
Spread through air : Common cold, for example, spreads through air. When an infected person sneezes or coughs or spits, the little droplets of moisture carrying the microbes (virus in this case) are spread in the air. A healthy person standing nearby can inhale these droplets causing infection in that person.

Spread through carriers : Some insects and animals act as carriers of disease-carrying microbes. Houseflies, mosquitoes, cockroaches and rats are carriers of diseases.

Houseflies are the most common among all the disease carriers. They carry germs of diseases from the infected person's excreta or the garbage to the food and drinking water of a healthy person. Whenever a healthy person eats contaminated food, he may fall sick. In this manner, diseases get spread from one infected person to a healthy person through carriers. Diseases like cholera and typhoid are spread through houseflies.

4. Nitrogen fixation

Nitrogen present in the atmosphere is unreactive under normal conditions. But during lightning, nitrogen reacts with oxygen to produce oxides of nitrogen. The process of conversion of free nitrogen into compounds of nitrogen is called fixation of nitrogen.



The nitrates in the soil are absorbed by plants where they are converted into proteins. The proteins are useful for plants and animals for their growth.

The nitrogen cycle is called a perfect cycle because the amount of nitrogen which is getting converted into different forms and the amount which is released back into the atmosphere remain constant all the time.

D. Higher Order Thinking Skills (HOTS) :

- Ans.** 1. This is so because in summer the temperature is more, that enables bacterium lactobacillus to reproduce more at that temperature. Due to which lactobacillus show more activity in the milk and make curd in a short time.
2. The person is suffering from food poisoning. The spoilage of food by bacteria caused this disease.

3 Synthetic Fibres and Plastics



EXERCISE

Section-I

A. Tick (✓) the correct answer (MCQs) :

Ans. 1. c. 2. c. 3. b. 4. d. 5. b.

B. Fill in the blanks :

- Ans.** 1. Fabric means **cloth**.
2. The process by which artificial fibres are made from simple molecules is

- They are non-biodegradable.
- They are inflammable.

C. Define the following terms :

- Ans.**
1. **Polymerisation :** Polymerisation is the process by which artificial fibres are made from simple molecules.
 2. **Thermoplastics :** Thermoplastics or thermoplasts are the plastics which melt or become soft on heating and harden when cooled. They retain their plasticity even after repeated heating and cooling. Polythene and PVC are examples of thermoplastics. They are used to make bags, toys, etc.
 3. **Thermosets :** These are those plastics that does not soften on heating and cannot be reshaped.

D. Differentiate between the following :

- Ans.** 1. **Synthetic and Natural Fibres**

| Synthetic Fibres | Natural Fibres |
|--|---|
| Clothes made from it can not be worn during summer. They are not attacked by moths, insects, etc. They are cheap in cost. They are light in weight. They dry very quickly. | Clothes made from it can be worn during summer. They are attacked by moths, insects, etc. They are expensive. They possess more weight. They absorb more water hence take more time to dry. |

Thermoplastic and thermosetting plastic

Thermoplastic

1. Thermoplastics are long chain polymers with no cross-linking. Heating also does not produce any cross-linking between the chains.
2. Thermoplastics can be processed repeatedly.
Example : Polythene, PVC, Polystyrene, Nylon, Polyesters, etc.

Thermosetting plastic

1. Thermosetting plastics are the polymers in which chains get highly cross-linked on heating.
2. Once moulded, thermosetting plastics cannot be reprocessed.
Example : Bakelite, Melamine-formaldehyde resin.

E. Long Answer Type Questions :

- Ans.**
1. Synthetic polymers are made to replace natural polymers. This is so because they have the following advantages :
 - They are more durable.
 - They are less expensive.
 - They are readily available and easy to maintain.
 - They dry up quickly and are wrinkle resistant.

- They are not attacked by insect pests, like moths, worms, etc.
2. Nylon is so useful for the following reasons :
 - It is very strong, i.e., has high tensile strength.
 - It is shiny and elastic.
 - It is easy to wash.
 - It is light weight.
 - It can be easily dyed in various colours.
 - It absorbs less water and dries quickly.
 - It retains its shape.
 - It has wash-and-wear properties, i.e., it does not require ironing.
 - It is easy to maintain as it is wrinkle-free.
 - It is soft and smooth.
 - It is a long-lasting fabric.
 - It is resistant to attack by moths, fungus, etc.
 3. **Natural fibres** : • These fibres are obtained from natural materials.
 - These can easily be attacked by moths, insects, etc.
 - These are expensive.
 - They absorb water easily.**Synthetic fibre** : • These fibres are obtained from man-made materials.
 - These cannot be attacked by moths, insects, etc.
 - They are comparatively cheaper in cost.
 - They do not absorb water, hence, are not suitable to be worn in summers.

4 Materials : Metals and Non-metals



EXERCISE

Section-I

A. Tick (✓) the correct answer (MCQs) :

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

B. Fill in the blanks :

- Ans.** 1. All metals with the exception of **mercury** are solid at room temperature.
 2. Metals are **ductile**.
 3. The characteristic shine of metals is called **luster**.
 4. **Bromine** is the only non-metal to occur as liquid.

C. Write 'true' or 'false' :

Ans. 1. False 2. False 3. False 4. False

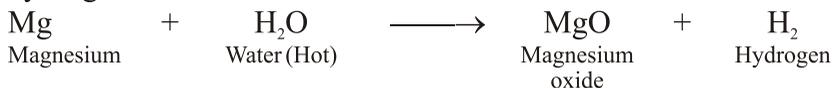
Section-II

A. Very Short Answer Type Questions :

- Ans.** 1. Sodium
 2. Silver
 3. No, all metals do not liberate hydrogen gas from dilute acids. Gold and silver do not liberate hydrogen gas from dilute acids.

B. Short Answer Type Questions :

- Ans.** 1. Metals : Iron, Copper, gold
Non-metals : Hydrogen, oxygen, nitrogen
2. Magnesium reacts with hot water slowly to form magnesium oxide and hydrogen.



3. Metalloids are those elements which have some properties of metals and some of non-metals. For example, antimony, arsenic and tellurium.
4. Metals usually have high melting and boiling points. The melting point of copper is 1083°C and iron is 1535°C.

C. Define the following terms :

- Ans.** 1. **Malleability** : Malleability is the property of being beaten into sheets without breaking.
2. **Metalloids** : The elements which have the properties of both metals and non-metals.
3. **Ductility** : The property of being drawn into wires. Such as gold can be drawn into thin wires.
4. **Sonority** : It is the property of producing sound.

D. Differentiate between the following :

- Ans.** 1. Differences between physical properties of metals and non-metals are as follows :

| Characteristics | Metals | Non-Metals |
|-----------------------------------|--|--|
| Physical state | Solids except mercury is a liquid. | Solids or gaseous except bromine which is a liquid. |
| Conductivity | Good conductors of heat and electricity except lead which is a poor conductor. | Poor conductors except graphite which is good conductor. |
| Density | High density (except sodium, potassium) | Low density. |
| Ductility | Ductile | Non-ductile. |
| Hardness | Hard (except sodium, potassium) which are soft metals. | They are soft except diamond. |
| Lustre | Lustrous | Non-lustrous or dull except diamond and iodine that have lustre. |
| Malleability | Malleable | Non-malleable and brittle. |
| Melting points and boiling points | High melting and boiling points except sodium and potassium. | Low melting and boiling points except graphite. |
| Sonority | Sonorous | Non-sonorous |
| Tensile strength | High tensile strength. | Low tensile strength. |

2. Differences between chemical properties of metals and non-metals are as follows :

| Metals | Non-metals |
|--|---|
| 1. Metals react with oxygen to form their oxides which are basic in nature. | 1. Non-metals react with oxygen to form their oxides, which are either acidic or neutral in nature. |
| 2. More active metals displace hydrogen from cold water or steam. | 2. Non-metals do not displace hydrogen from water. |
| 3. Metals react with dilute mineral acids and displace hydrogen from them. | 3. Non-metals do not displace hydrogen from dilute mineral acids. |
| 4. Metals like aluminium, zinc, lead and tin displace hydrogen from alkalis. | 4. Non-metals form complex products with alkalis, but do not displace hydrogen. |
| 5. Metals show chemical displacement reactions. | 5. Non-metals do not show chemical displacement reactions. |

E. Long Answer Type Questions :

- Ans.** 1. Metals and non-metals differ in physical properties in the following ways :

Metals

| Metals | Non-metals |
|--|--|
| 1. Metals are generally solids at room temperature except mercury which is a liquid. | 1. Non-metals are generally solids or gases except bromine, which is a liquid. |
| 2. They have high density. | 2. They have low density except diamond (carbon). |
| 3. They are malleable, non-brittle and ductile. | 3. They are non-malleable, brittle and non-ductile. |
| 4. They have high melting and boiling points except mercury and gallium. | 4. They have low melting and boiling points. |
| 5. They are good conductors of heat and electricity. | 5. They are generally bad conductors of heat and electricity except graphite (carbon). |

2. The common uses of metals in our daily life are as follows :
- Metals being good conductors of heat are used for making cooking utensils.
 - Gold, silver and platinum are used to make jewellery.
 - Iron, copper and aluminium are used to make cooking utensils, fittings.

- Copper and aluminium are used to make wires to conduct electricity.
 - Mercury is used for making thermometers.
 - Iron in its different forms is used in the construction of buildings.
 - Aluminium and zinc are used in coating iron to prevent its rusting.
3. Non-metals are useful to us in our day to day life because we are able to do many of our works only because of them. Some of their uses are as follows :
- Chlorine is used as disinfectant and for water purification.
 - Phosphorus is used in manufacturing of phosphoric acid and superphosphate fertiliser.
 - Sulphur is used for making sulphuric acid which in turn is used for making plastics, dyes, drugs, detergents, explosives and fertilisers.
 - Phosphorus is used in the preparation of fireworks and smoke screens.
 - Powdered graphite is used as a dry lubricant.

F. Higher Order Thinking Skills (HOTS) :

- Ans.** 1. Goldsmiths use outermost flame to burn gold and silver because gold and silver have very high melting points. Only the outermost flame has such high temperature.
2. This is so because silver is a very expensive metal.

5 Coal and Petroleum



EXERCISE

Section-I

A. Tick (✓) the correct answer (MCQs) :

- Ans.** 1. c. 2. a. 3. d. 4. c. 5. d.

B. Fill in the blanks :

- Ans.** 1. Air, water, soil, forest and minerals are called **natural resources**.
2. **Coal** is obtained from coal mines.
3. **Coal tar** is a by product of destructive distillation of coal.
4. World's first oil well as drilled in **Pennsylvania** USA, in 1859.
5. Oil was drilled for the first time in India in 1867, in **Makum, Assam**.

C. Write true or false :

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

D. Tick (✓) the odd-one out giving reason :

- Ans.** 1. Air, Water, Soil, Forests, **Plastics**, Minerals
Reason : It is a man-made material. Rest are natural.
2. LPG, Kerosene, **Asphalt**, Petrol
Reason : It is obtained from coal. Rest are obtained from mineral oil.
3. Coal, **Wood**, Petroleum, Natural gas
Reason : It is not a fossil fuel. Rest are.
4. Lubricating oil, Paraffin wax, Fuel oil, **Asphalt**

Reason : It is a by-product of destructive distillation of coal. Rest are by-products of destructive distillation of mineral oil.

Section-II

A. Very Short Answer Type Questions :

- Ans.** 1. Natural resources are those resources that are provided to us by nature—such as air, water, sunlight, soil, etc.
2. The slow conversion of wood into coal by a biochemical process extending over millions of years is called carbonisation.
3. Coal gas is obtained on destructive distillation of coal.
4. Greenhouse gas is a gas that contributes to the greenhouse effect by absorbing infrared radiation.
5. Methane

B. Short Answer Type Questions :

- Ans.** 1. The resources which are present in an unlimited amount in nature, can be continually replenished and are not likely to be exhausted by various human activities are called inexhaustible natural resources. Air, sunlight, water and soil are inexhaustible natural resources.
2. Chemically coal contained carbon along with variable quantities of other elements like sulphur, hydrogen, oxygen and nitrogen.
3. Coke is a solid material produced by the destructive distillation of bituminous coal.
4. CNG is natural gas stored under high pressure. It is used in heating, cooking, power generation, motor vehicles and to produce nitrogen for fertilizer, and carbon black for use in the tyre industry.
5. We should save fossil fuels because these sources are limited and may get exhaust sooner or later.

C. Define the following terms :

- Ans.** 1. **Fossil fuels :** The fuels formed from the fossils of dead organisms over a span of millions of years.
2. **Destructive distillation :** Destructive distillation is the process by which organic substances like wood, coal and oil are broken down into solids, liquids and gases, which are then used to make products such as coke, charcoal, coal tar, oils and gases.
3. **Carbonisation :** Carbonisation is the process of converting wood into coal under high temperature, high pressure and in the absence of air.
4. **Coking :** Coking is the process of making coke by destructive distillation of bituminous coal.

D. Long Answer Type Questions :

- Ans.** 1. The resources which are present in a limited amount in nature, cannot be continually replenished and are likely to be exhausted by various human activities are called exhaustible natural resources. Petroleum, coal, natural gas, minerals and forests are exhaustible natural resources.

- Coal was formed in prehistoric times (200 to 250) million years ago when huge forest areas got buried under the surface of the Earth. Under the humid and hot conditions, they were attacked by anaerobic bacteria which progressively removed hydrogen and oxygen, leaving behind carbon. Due to very high temperature and pressure of the Earth, the carbon got compact to form stony residues, called coal. Some amount of methane was also formed due to action of anaerobic bacteria, which was trapped in the coal.
- Coal tar is a thick black liquid, it is a by-product of destructive distillation of coal. It is used in making roads and as a roofing material. It is used in various industries like synthetic dyes, fabric, explosives, perfumes, plastics, paints and photographic material. It is also used in shampoos to combat dandruff and lice. Naphthalene balls used to repel pests are obtained from coal tar.

4.

| Constituent | Uses |
|-------------------------------|---|
| LPG (Liquefied Petroleum Gas) | Domestic fuel, used to make carbon for tyres and in paper industry. |
| Kerosene | Fuel for stoves, lamps, aviation (jet aircraft) |
| Lubricating Oil | Lubricant for machinery. |
| Paraffin Wax | Candles, cosmetics, Vaseline. |
| Petrol | Fuel for light vehicles, solvent for dry cleaning. |
| Diesel | Fuel for generators and heavy vehicles. |
| Bitumen | Making road surfaces, paints, etc. |

E. HOTS Order Thinking Skills (HOTS):

- Ans.** 1. Fossil fuels should be used judiciously because they cannot be replenished once exhausted.
 2. This is so because it has 98% carbon in it.

6 Combustion and Flame



EXERCISE

Section-I

A. Tick (✓) the correct answer (MCQs):

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

B. Fill in the blanks:

- Ans.** 1. **Water** should not be poured over burning petrol, kerosene, or diesel.
 2. **Bursting of fire crackers** is an example of an explosion.
 3. When a fuel is burnt, the region of burning of the fuel is called **flame**.
 4. **Fuels** are the substances that burn to produce heat energy.
 5. Greenhouse effect leads to **global warming**.

C. Write true or false :

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

D. Tick (✓) the odd-one out giving reason :

- Ans.** 1. Carbon monoxide, ~~Haemoglobin~~, Incomplete combustion, Nitrogen
Reason : It is not associated with fuel. Rest are.
2. Acid rain, Oxides of nitrogen, Oxides of sulphur, ~~Carbon dioxide~~
Reason : It is a greenhouse gas. Rest are related to acid rain.
3. Oxygen, Nitrogen, Carbon dioxide, ~~Carbon monoxide~~
Reason : It is not a pure gas. Rest are.
4. Petrol, ~~Biogas~~, Kerosene, Diesel
Reason : It is a gaseous fuel. Rest are liquid fuels.

Section-II

A. Very Short Answer Type Questions :

- Ans.** 1. No, combustion cannot take in absence of air or oxygen.
2. Carbon monoxide is more harmful than carbon dioxide. It is the most dangerous air pollutant.

B. Short Answer Type Questions :

- Ans.** 1. The three conditions necessary for combustion are :
i. Presence of a combustible substance.
ii. Presence of a supporter of combustion.
iii. Attainment of ignition of kindling temperature of the combustible substance.
2. An ideal fuel should have the following characteristics :
i. It should be fairly cheap and easily available.
ii. It should burn at a moderate rate.
iii. It should not produce any poisonous and irritating fumes during burning.
iv. It should leave no residue (ash) after burning.
3. (a) Solid fuels : Wood, charcoal
(b) Liquid fuels : kerosene, petrol
(c) Gaseous fuels : Biogas, natural gas
4. In this type of combustion, large amount of heat and light are released in a very short span of time. Combustion of LPG, which produces heat and light instantly, is an example of rapid combustion.

C. Define the following terms :

- Ans.** 1. **Luminous flame** : A yellow flame which produces heat and appreciable amount of light is called luminous flame. A luminous flame is obtained when a fuel undergoes partial (or incomplete) combustion.
2. **Ignition temperature** : The lowest temperature up to which a substance must be heated before it catches fire is called its ignition temperature.
3. **Complete combustion** : The combustion in which the substance gets completely burnt to form the highest oxide of the substance is called complete combustion.

4. **Fuels :** Fuels are those combustible substances which on burning produce a large amount of heat and light.

D. Long Answer Type Questions :

Ans. 1. Luminous Flame

A yellow flame which produces heat and appreciable amount of light is called a luminous flame. A luminous flame is obtained when a fuel undergoes partial (or incomplete) combustion.

A fuel undergoes incomplete/partial combustion only when the supply of air (or oxygen) is insufficient. So, when a fuel burns in the presence of limited (insufficient) air, a luminous flame is produced.

Non-luminous Flame

A blue-coloured flame which produces very little light is called nonluminous flame. A nonluminous flame is obtained when the fuel is completely burnt. In other words, when a fuel undergoes complete combustion, a nonluminous flame is produced.

A fuel undergoes complete combustion only when the supply of air or oxygen is sufficient. Thus, when a fuel burns in the presence of sufficient air, a non-luminous flame is produced.

LPG burns with a non-luminous flame. Kerosene burns with a non-luminous flame in a pressure stove.

2. (i) **Calorific value of a fuel :** The amount of heat produced when one unit mass of a fuel is completely burnt in air (or oxygen) is called its calorific value.

The calorific values are expressed in the units : kilojoule per gram, (denoted as kJ/g or KJg⁻¹) or kilojoule per kilogram (denoted as kJ/kg).

(ii) **Greenhouse effect :** An increase in the concentration of carbon dioxide in the atmosphere leads to an increase in temperature on the earth. This is called greenhouse effect.

The greenhouse effect is the rise in temperature that the Earth experiences because certain gases in the atmosphere (carbon dioxide and methane) trap energy from the Sun.

(iii) **Global warming :** Heating up of the Earth's atmosphere due to trapping up of the infrared radiation by carbon dioxide in the atmosphere is called the global warming. It :

- causes changes in the pattern of crop cultivation.
- adversely affects the monsoon rains.
- causes excessive melting of polar ice, thereby raising the level of water in seas and ocean. This may even cause flooding and submerging of many low-lying areas.

3. (i) **Fuel :** A fuel can be any substance that produces a large amount of heat and light on burning. It can either be solid, liquid or gas.

(ii) **Calorific value :** The efficiency of a fuel is mainly decided by the amount of heat it releases on complete combustion of its one kg of fuel,

and this is known as the calorific value of a fuel.

Calorific value of fuels is used to compare the efficiency of a fuel. Higher is the calorific value of a fuel, better it is.

The standard unit of calorific value is kilojoule per kilogram (kJ/kg).

E. Higher Order Thinking Skills (HOTS) :

- Ans.** 1. Yes, this statement is true. For example, paper is a combustible substance, but it cannot be used as fuel. Only those substances are used as fuel that produces a large amount of heat.
2. This is so because green leaves have a high ignition temperature in comparison to that of dry leaves.

7 Conservation



EXERCISE

Section-I

A. Tick (✓) correct answer (MCQs) :

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

B. Fill in the blanks :

- Ans.** 1. Cutting of forests for other purposes is called **deforestation**.
2. There are **515** wildlife sanctuaries in our country.
3. **Afforestation** is planting trees on large areas.
4. Indian Board for wildlife (IBWL) was constituted in **1952**.
5. The national park at **Satpura** is the first Reserve forest of India.

C. Write true or false :

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

D. Tick (✓) the odd-one out giving reason :

- Ans.** 1. Great Nicobar, **Madhubani**, Pachmarhi, Kanchenjunga
Reason : It is a form of painting. Rest are biosphere reserves.
2. Asiatic lion, **Golden langur**, Blue whale, Crocodile
Reason : It is an extinct species. Rest are endangered.
3. Sal, Teak, Jamun, **Chéetal**, Arjun
Reason : It is included in fauna. Rest are flora
4. Air, Plants, **Minerals**, Sunlight, Rainfall
Reason : These are limited. Rest are unlimited

Section-II

A. Very Short Answer Type Questions :

- Ans.** 1. Forest is considered a renewable natural resource because it grows on its own after a period of time.
2. Biosphere is the largest of the three.
3. Wildlife are the plants and animals found in a forest.

B. Short Answer Type Questions :

- Ans.** 1. Biodiversity or biological diversity is the measure of the variety of the

- Earth's animal, plant and microbial species.
- The term 'ecology' refers to the study of the relationship among organisms and the environment in which they live, including all living and non-living components.
 - (i) Cutting of trees for timber, making furniture and using it as fuel in houses/industries.
(ii) Land for building houses and factories.
 - A biosphere reserve is a large multipurpose protected area for conservation of wildlife, plant and animal resources.
 - Red Data Book contains a record of all those species of plants and animals which are under the threat of extinction or are rare and vulnerable for extinction.

C. Define the following terms :

- Ans.**
- Biodiversity :** Biodiversity is the variety of life on Earth. It includes the variability of species in different habitats, the diversity of microorganisms, plants and animals. It is an essential component of nature and it ensures the survival of human species by providing food, fuel, shelter, medicines and other resources to mankind.
 - Red Data Book :** The Red Data Book is the state document established for documenting rare and endangered species of plants and animals that exist within the territory of the state or country. This book provides central information for studies and monitoring programs or rare and endangered species and their habits.
 - Endemic species :** We refer those species which are restricted to a particular geographical region as endemic species.
 - Recycling :** Recycling means to convert waste material in a form in which it can be used again.

D. Long Answer Type Questions :

- Ans.**
- Maintenance of biodiversity is important for ecological stability and as a resource for research into new drugs and crops. Research suggests that biodiversity is far greater than previously realized, especially among smaller organisms. e.g., it is thought that only 1-10% of the world's bacterial species have been identified. However, the destruction of habitats (which are occurring these days) is believed to have resulted in the most severe and rapid loss of diversity in the history of the planet. Monoculture cropping system, overgrazing by animals, deforestation and pollution of land and water are some other factors which has led to the loss of biodiversity.
 - Various types of effects of deforestation are :**
 - Climatic changes :** The climate of the region changes. It becomes hot locally and rainfall decreases.
 - Imbalance in atmospheric gases :** The atmospheric gaseous proportion changes. Oxygen content is reduced. CO₂ (carbon dioxide) accumulates,

which causes air pollution.

3. Pollution : Pollution of air takes place.

4. Depletion in soil fertility, soil water and soil texture : Fertility of soil is lost, water level of the soil is lowered, and soil texture is disturbed due to no humus formation.

5. Natural calamities : Natural calamities such as floods, droughts and famines may result.

6. Global warming : Due to accumulation of carbon dioxide, heat of sunrise is retained. This results in higher temperature and global warming.

7. Habitat and vegetation loss : It results in the loss of habitat of organisms. Wildlife loses their home and environment. Vegetation is reduced.

8. Soil erosion : Loss of soil takes place as no trees are there to hold the soil at place.

3. Forests can be conserved by taking following steps :

- **Reforestation :** Planting trees on large areas both in plains and hills.
- **Prevention of Forest fires :** Protection of forests from forest fires.
- **Protection of trees and plants from insects and pests :** Insects and pests destroy trees, plants and other forest products. They must be protected from them.
- **Grazing to be controlled :** Excessive grazing in and near the forests should be stopped.
- **Use of wood/timber to be discouraged :** Alternatives to firewood and timber etc. should be used.

Government should frame strict laws for the protection of forests. Protection of forests should not be considered as the duty of Government alone. We all should help in the conservation of forests.

4. The natural area where wildlife gets protected and preserved is called wildlife sanctuary.

These places provide suitable living conditions to wildlife. Here killing, poaching or capturing of wildlife animals are strictly prohibited, e.g., Pachmarhi Wildlife Sanctuary.

These places are characterised by :

- Unique landscapes, mountain forests, broad leaf forests and virgin bush lands in deltas of big rivers.
 - Some of the threatened wild animals of wildlife sanctuaries are black buck, white-eyed buck, python, rhinoceros, marsh crocodile, golden cat, elephant, pink-headed duck, etc.
5. Birds migrate from one place to another for the following reasons :
- To escape from the inhospitable climate.
 - To enable themselves to find plenty of food throughout the year.
 - For example, in winter when food sources are limited in northern areas, birds fly towards south where the weather is mild and food is in

plenty.

- To lay their eggs in more hospitable place.

E. Higher Order Thinking Skills (HOTS) :

- Ans.** 1. The natural resources should be used thriftily because they are an essential part of our lives and cannot be substituted by any other things.
2. We should protect animals such as tigers because they are an integral part of maintaining our ecological balance.

8 Cell : Structure and Functions



EXERCISE

Section-I

A. Tick (✓) the correct answer (MCQs) :

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

B. Fill in the blanks :

- Ans.** 1. The single-celled organisms are called **unicellular organisms**.
2. Cell differ in their **shapes** and **sizes**.
3. **Cell membrane** is a thin outer covering of a cell.
4. **Ribosomes** is the site of protein synthesis.
5. Cytoplasm is composed of many living and non-living parts called **cell organelles**.

C. Write true or false :

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

D. Tick (✓) the odd-one out giving reason :

- Ans.** 1. Chloroplast, Leucoplast, Chromoplast, **Cytoplasm**
Reason : It is found both in plants and animals. Rest are found only in plants.
2. Amoeba, Paramecium, Euglena, **Yeast**
Reason : It is a unicellular plant. Rest are unicellular animals.
3. DNA, Genes, **Cytoplasm**, Chromosomes
Reason : It is not a part of nucleus. Rest are.
4. Nucleolus, Nucleoplasm, Chromosome, **Lysosome**
Reason : It is not found in nucleus. Rest are.

Section-II

A. Very Short Answer Type Questions :

- Ans.** 1. *Paramecium* and *Amoeba*
2. Cell membrane
3. Lysosome
4. Mitochondria, endoplasmic reticulum, ribosome, golgi bodies and vacuoles.
5. A cell is the basic unit of structure and function in all living beings.

B. Short Answer Type 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. These were dead cells. They were actually empty spaces surrounded by cellulose wall.
2. Unicellular organisms consists of only one (single) cell. Multicellular organisms consists of cells numbering from a few to billions.
3. Cell membrane separates cells from one another and also from the surrounding medium. It serves as a boundary that separates the contents of the cell from the outer environment. It is composed of proteins and lipids (compounds that do not dissolve in water such as fats, oils, etc.)
4. Nucleus is a squamous or oval shaped body floating in the cytoplasm. It controls everything that happens in the cells. It consists of the following four parts! nuclear membrane, nucleoplasm, nucleolus and chromosomes.
5. Mitochondria are oval or rod shaped organelles commonly called 'Powerhouse of the cell' because the production of energy from food takes place here.
6. Cell division is important for an organism to grow and develop.

C. Define the following terms :

- Ans.** 1. **Cell** : A cell is the smallest unit of life. It is capable of performing all biological activities in any living organism.
2. **Genes** : These are the basic hereditary units present in chromosomes. They are responsible for passing genetic characteristics from the parents to the off springs.
3. **Vacuoles** : The clear spaces present in the cytoplasm which are surrounded by a membrane are called vacuoles.
4. **Nucleus** : This is a dense body found in the centre of the cell which controls all the activities of the cell.

D. Differentiate between the following :

- Ans.** 1. **Plant cell** : Its size is large and in it cell wall is present. Also we can find cell membrane and plastids. Other than it, in plants vacuoles are large and permanent, filled with liquid, and occupy the centre.
Animal cell : Its size is generally smaller than the plant cell. In it cell wall is present but cell membrane is absent. In animal cells plastids are absent. Also vacuoles are either absent or, if present, are very small and temporary.
2. **Cytoplasm** : The cytoplasm is a jelly-like substance occupying most of the space inside the cell. It occupies the space between the cell membrane and the nucleus. All the life functions take place in the cytoplasm. The cytoplasm contains many important tiny components or structures called

the organelles which perform the various life functions.

Nucleoplasm: It is a dense fluid present in nucleus. It consists of about 80 per cent water and also has carbohydrates, fats and proteins.

E. Long Answer Type Questions :

Ans. 1.

Plant Cell

1. A rigid cell wall is present.
2. Chloroplasts are present.
3. Large vacuoles are present and occupy a large portion of the cell.
4. Centrosomes are absent.

Animal Cell

1. Cell wall is absent.
2. Chloroplasts are absent.
3. Vacuoles are either absent or very small and few in number.
4. Centrosomes are present.

2. Cell division responsible for growth in the following way :

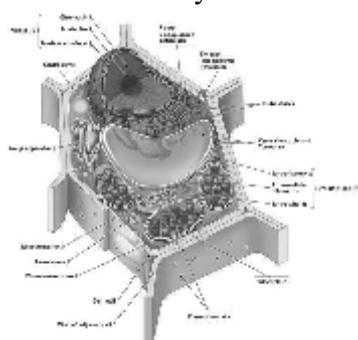
Plants and human beings start their life as a single cell. This single cell produces billions of cells. A small seed grows into a big plant or small baby grows into full grown human being. It is so because a cell grows and then divides into two, increasing the number of cells. This process is called cell division.

The cells resulting from the cell division of a plant cell are called daughter cells. The daughter cells resemble that parental cell in a number of characters. Daughter cells grow to their maturity and divide again. New cells are required in our body not any for growth but also for replacement of old worn out or damaged cells.

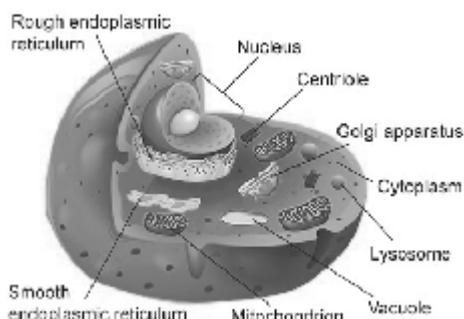
3. Amoeba is a unicellular quatic animals. Amoeba has irregular shape which keeps on changing slowly. It has projections on its body which are called pseudopodia. Amoeba moves slowly and catches its prey with the help of pseudopodia.

Food taken in by Amoeba is digested in food vacuole.

4.



Plant cell



Animal cell

F. Higher Order Thinking Skills (HOTS) :

- Ans. 1. Slide B has animal cell. This is so because animal cells do not contain cell wall and chloroplasts.
2. Animal cells do not need cell walls because they are smaller in size.

9

Reproduction in Animals



EXERCISE

Section-I

A. Tick (✓) the correct answer (MCQs) :

Ans. 1. b. 2. b. 3. a.

B. Fill in the blanks :

- Ans. 1. **Reproduction** is one of the important characteristics of living beings.
 2. The process of fusion of male and female gametes is called **fertilization**.
 3. **Internal** fertilization which takes place inside the female body.
 4. Animals that lay eggs, which hatch into offspring are called **oviprous**.
 5. **Budding** is common in Hydra.

C. Write 'true' or 'false' :

Ans. 1. true 2. false 3. true 4. true 5. true 6. false

Section-II

A. Very Short Answer Type Questions :

- Ans. 1. Male human beings produce sperms while female human beings produce ova or eggs.
 2. Zygote is the fertilized egg formed due to fusion of the sperm and the egg.
 3. The two main modes of reproduction in animals are sexual reproduction and asexual reproduction.

B. Short Answer Type Questions :

- Ans. 1. Reproduction is the production of new individual from the parents of the same species. Organisms reproduce to continue their life forms.
 2. Internal reproduction takes place inside the female body whereas external reproduction takes place outside the female body.
 3. **a. Reproductive system of human :** In humans, male and female gametes are produced by two different individuals. Males produce the sperms (male gametes) while the female gamete (ovum or egg) is produced by the females.
b. Reproductive system of female : A pair of ovaries, oviducts (fallopian tubes), uterus, (womb), vagina.
 4. A hermaphrodite is an organism that has reproductive organs normally associated with both male and female sexes.
 5. Metamorphosis is the process of transformation of larva into an adult through drastic changes.

C. Define the following terms :

- Ans. 1. **Fertilization :** The process of fusion of male and female gametes is called fertilization.
 2. **In vitro fertilisation :** It is a fertilisation outside the female body. In this method a freshly released egg and sperms are collected and kept together for a few hours. If fertilisation of the egg by the sperm is successful, the zygote is allowed to develop for about a week. The developed Zygote is then placed in the mother's uterus. The further development of zygote and the embryo takes place in the uterus of the mother. The baby is born at the appropriate time like other babies.
 3. **Foetus :** The stage of the embryo when all the body parts can be identified is

called foetus. When the foetus gets fully developed, the mother gives birth to the baby.

4. **Test Tube baby** : A test tube baby is a baby who is born normal, but who grew from an egg cell taken from the mother's body and artificially united with a sperm cell in a laboratory. The fertilized egg cell (called an embryo) grows in the laboratory until it has divided into eight cells. Then it is introduced into the mother's womb (uterus) so that it can develop normally.
5. **Zygote** : During fertilisation, the nucleus of the sperm and the egg fuse to form a single nucleus. The fertilized egg is called Zygote.
6. **Binary fission** : The type of asexual reproduction in which an individual reproduces by dividing into two individuals is called binary fission.
7. **Embryo** : When the fertilized egg called zygote reaches the uterus, it implants itself there. During the first eight weeks after fertilization, the baby is called the embryo.
8. **Budding** : It is a type of asexual reproduction in which a new organism develops from an outgrowth or bud due to cell division at one particular site. The new organism remains attached as it grows, separating from the parent organism only when it is mature, leaving behind scar tissue.

D. Differentiate between the following :

Ans. 1. **Budding** : In this a new organism develops from the mother organism. For example, hydra reproduces by this method.

Binary fission : In this mother organism (nucleus) is divided into two daughter organisms (nuclei) which then develop into full grown organism.

2. **Sperm** : It is produced by males for the process of reproduction.

Ovum : It is produced by females for the process of reproduction.

3. **Oviparous animals** : These animals reproduce by laying eggs. These eggs later develop into young ones.

Viviparous animals : These are those animals that give birth to young ones.

E. Long Answer Type Questions :

Ans. 1. In sexual reproduction, for reproduction to occur the sperm from the male has to reach the eggs of the female and the head of one sperm has to enter each egg. But unlike it, in asexual reproduction, fusion of egg and sperm is not required.

2. **Binary Fission in Amoeba**

This method of asexual reproduction is very common in unicellular microscopic organisms like Amoeba and Paramecium. Let us study this method in Amoeba.

The organism starts the process by the division of the nucleus into two nuclei. This is followed by division of its body into two, each part with a nucleus.

Finally two daughter Amoebae are produced from one parent Amoeba. The daughter Amoebae then grow into full size.

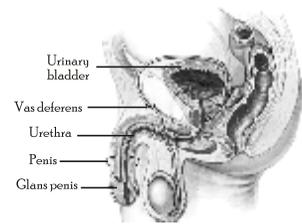
3. **Male Reproductive Organs**

Figure given here shows the reproductive organs found in a male. These include the following :

i. A pair of testes (singular testis) enclosed in a scrotal sac (or scrotum) outside the body; millions of sperms are produced by the testes.

ii. Two sperm ducts, one from each testis; the sperms from the testes leave through the sperm ducts and reach the penis.

iii. A penis; sperms are injected into the body of the



Male reproductive organs in humans

female through this structure.

4. Female Reproductive System

The female reproductive system consists of the following parts :

- There are a pair of ovaries that produce female gamete (sex cell), i.e., ova or eggs. Ovum (or egg cell) is about 1 mm in diameter.
 - The ovaries also produce female sex hormones called estrogen and progesterone.
 - Fallopian tubes (oviducts) take up the ovum and transport it to the uterus. Fallopian tubes have finger-like projections and open up in a funnel shaped structure.
 - The finger-like projections receive the ovum (egg cell) as it comes out of the ovaries. The fertilisation of egg (or ovum) by a sperm takes place in the oviduct (fallopian tubes).
 - Uterus is a bag (womb) where the fertilised egg develops into a baby.
 - Cervix is a ring of muscles that closes the lower end of the uterus.
5. The first step in the process of reproduction is the fusion of a sperm and an ovum. For this to happen, millions of sperms from the male are transferred into the female body. The sperms swim in the oviduct with the help of their tails to reach the egg. When they come in contact with the egg, one of the sperms may fuse with the egg. Such fusion of the egg and the sperm is called fertilization. During fertilization, the nuclei of the sperm and the egg fuse to form a single nucleus. This results in the formation of a fertilized egg or zygote. The zygote undergoes division and specific changes to grow into a new individual. Do you know that the zygote is the beginning of a new individual? The process of fertilization is the meeting of an egg cell from the mother and a sperm cell from the father.
6. Formation of an individual from the zygote is called development. The zygote divides repeatedly to give rise to a ball of cells. The cells then begin to form groups. These groups then develop into different tissues and organs of the body. This developing structure is termed as embryo. The embryo then gets embedded in the wall of the uterus. The embryo continues to develop in the uterus. It gradually develops body parts—hands, legs, head, eyes, ears, etc. The stage of the embryo when all the body parts can be identified is called foetus. When the foetus gets fully developed, the mother gives birth to the baby.
7. In Hydra, a small bulb-like outgrowth is formed on the body. This is the bud. The buds grow in size.
- The nucleus of the parent Hydra divides into two, and one of the nuclei moves into the bud. Then the bud detaches itself from the parent body. It grows to full size and becomes an independent individual.
 - The nucleus of the parent Hydra divides into two.
 - Then, one of the two nuclei passes into the bud.
 - The bud detaches itself from the parent body. It grows to full size and becomes a new individual.

F. Higher Order Thinking Skills (HOTS) :

- Ans.**
1. No, Anu was not telling the truth. The largest egg is laid by Ostrich. It is roughly $17.8 \text{ cm} \times 14 \text{ cm}$ in size.
 2. They do so to produce sperms and eggs so that they can fertilise.

10 Force and Pressure



EXERCISE

Section-I

A. Tick (✓) the correct answer (MCQs) :

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

B. Fill in the blanks :

- Ans. 1. A **force** is a push or a pull.
2. The force applied by the muscles of the body is called **muscular force**.
3. The unit commonly used for measuring force is called **kilogram force**.
4. **Pressure** is defined as the force acting on a unit area of a surface.
5. The S.I. unit of pressure is **pascal**.

C. Write true or false :

Ans. 1. true 2. true 3. false 4. false 5. true 6. true 7. false

Section-II

A. Very Short Answer Type Questions :

Ans. 1. Friction 2. Gravitational force 3. Pressure

B. Short Answer Type Questions :

- Ans. 1. • When we throw a ball.
• When we drag a chair or a table
2. i. A force acting on a body can change its state of motion.
ii. A force can change the direction of motion of a moving object.
iii. A force can change the shape and size of an object.
iv. A force can stop a moving object.
3. Friction is the force that opposes the relative motion between two surfaces that are in contact with each other.
4. This is done to minimise the area where force is to applied.
5. Camel can walk easily in desert because they have wide feet. As such the area of contact of the feet and sand is large, the feet does not sink in the sand.

C. Define the following terms :

- Ans. 1. **Force** : Force is a push or a pull acting on an object.
2. **Pressure** : Pressure is the thrust acting normally upon a unit area of a surface.
3. **Newton** : It is the SI unit of force. The force required to lift 100 g of mass vertically is called 1 Newton.
4. **Simple barometer** : It is an instrument that is used for measuring the pressure of the atmosphere. It was designed by Torricelli in 1643. It consists of a 1 m (100 cm) glass tube which is fully filled with pure and dry mercury, so that all air bubbles are tapped out while filling. The filled tube is turned over and placed in a dish of mercury.

D. Differentiate between the following :

- Ans. 1. **Electrostatic force** : It is the force exerted by electrostatic charge. It can be attractive or repulsive.

Magnetic force : It is the force exerted by a magnet on other objects. It can exert pull on objects made of iron, cobalt and nickel.

2. **Force :** A force is a physical cause that changes, or tends to change, the state of rest or of motion, of an object. Its SI unit is Newton.

Pressure : The thrust acting normally upon a unit area of a surface is called pressure. The SI unit of pressure is pascal.

E. Long Answer Type Questions :

- Ans.** 1. A push or pull acting on a body which tends to change its state of rest or of motion is called a force.

Force has the following effects on objects.

Force can make a stationary object move or make a moving object move faster : A toy car can be made to move by giving it a little push. Similarly, a stationary football can be made to move by giving it a small push (i.e., by kicking it). If we have an already moving toy car or ball, we can make it move faster by giving it a push in the direction in which it is moving. Thus, a force can make a stationary object move, and it can also make an already moving object move faster.

Force can slow down or completely stop a moving object : A moving toy car can be made to stop by applying a force. A bicycle can be stopped or slowed down by applying the brakes. In football, the force applied by the goalkeeper stops the ball hit towards the goal. In order to stop or slow down a moving body, we need to apply a force in a direction opposite to the direction of motion of the moving body.

Force can change the direction of a moving object : In cricket, when a batsman hits the ball that is bowled at him, the direction in which the ball is moving changes. In football, the players can change the direction of the moving ball by kicking it in a different direction. In these examples, force changes the direction of a moving object.

Force can change the shape or size of an object : While making chapattis, we change the shape of the dough by applying force with our hands. The shape of a rubber band changes when it is pulled. You can also break things by applying a force. Materials that break easily when we apply a force are termed brittle. For example, objects made of glass and clay break easily when we apply force on them.

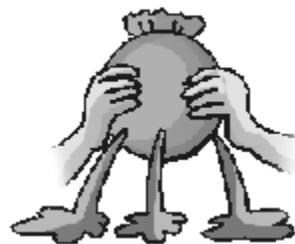
2. Pascal's law states that-pressure applied to a liquid is transmitted equally in all the directions.

This can be proved by the given experiment.

Fill a thick polythene bag with water. Make several holes in the bag with a fine pin. Squeeze the bag gently. What do you see? Water streams out in all directions with equal force.

This shows that the pressure applied at any point on an enclosed liquid gets transmitted equally in all directions.

This statement is known as Pascal's law.



Pressure applied to a liquid is transmitted equally in all the directions

3. **(a) Depth :** The pressure exerted by a liquid increases with depth from the surface of the liquid. Also pressure of a liquid is same in all directions at the same depth.
(b) Amount : The pressure of a liquid has no connection with the amount of liquid held in the container.
(c) Shape and size of the container : The pressure of a liquid does not depend on the shape or size of the container.
4. Given : Force = 72N
 and pressure = 9 Pa
- $$\therefore \text{Area of contact} = \frac{\text{Force}}{\text{Pressure}} = \frac{72}{9} = 8 \text{ m}^2$$
5. A simple barometer consists of a long glass tube. The glass tube is sealed at one end. The other open end is filled with mercury. A millimetre (mm) scale is also attached to the glass tube. Due to air pressure, the mercury in the tube rises and reaches a certain level in the glass column. The atmospheric pressure is measured by the height of the mercury column. It is measured in millimetres. One atmosphere is equivalent to 760 millimetres of mercury. The column of the mercury moves up and down as the atmospheric pressure increases and decreases respectively. The height of the mercury column is independent of the shape and size of the glass tube.

F. Higher Order Thinking Skills (HOTS) :

- Ans.** 1. There are two forces acting on the rocket immediately after leaving the launch pad. Thrust pushes the rocket upwards by pushing gases downwards in the opposite direction. Weight is the force due to gravity pulling the rocket downwards towards the centre of the Earth.
2. This is so as the increase the area of contact between the load and head. It helps them in carrying load.

11 Friction



Exercise

Section-I

A. Tick (✓) the correct answer (MCQs) :

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

B. Fill in the blanks :

- Ans.** 1. Friction always produces **resistance**.
 2. The force which opposes the motion of a body over another is called **frictional force**.
 3. **Rolling friction** is less than sliding friction.
 4. The frictional force exerted by fluids (liquids and gases) is also called the **drag**.

C Write true or false :

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

Section-II

A. Very Short Answer Type Questions :

- Ans.** 1. This is so because of friction applied by ground on ball.
2. Streamlining is to construct or reconstruct an object to reduce the amount of drag it undergoes as it moves through a fluid, especially air or water.

B. Short Answer Type Questions :

- Ans.** 1. Friction is a force between two surfaces that oppose motion.
2. When we try to walk on a smooth well-polished floor wearing brand new shoes, we may fall down or slide because of the lack of friction between the floor and the shoes.
3. It is so because of the friction between the paper and the eraser.
4. Vehicle tyres have treads (grooves) on them so that they are effected by the friction in a minimum way.
5. Sandpapers have raised dots in them. This increases the friction between the two surfaces. This helps them in whitewashing or painting.

C. Define the following terms :

- Ans.** 1. **Frictional force** : Frictional force is the force which opposes the motion of a body over another.
2. **Static friction** : Static friction is the frictional force that exists between two bodies so long as they are relatively at rest, even though an external force is acting upon them. It is the opposing force that comes into play when one body tends to move over the surface of another but actual movement has not started.
3. **Dynamic friction** : If we increase the force applied on wooden block placed on a table such that the block starts sliding slowly, then the frictional force is termed as dynamic friction.

D. Differentiate between the following :

- Ans.** 1. **Rolling friction** : When a body rolls over the surface of another body, the friction developed between the surfaces is called rolling friction.
Sliding friction : It is the frictional force offered when sliding an object. It is always more than the rolling friction.
2. **Static friction** : It is the friction between any two bodies when one of the bodies just tends to move or slip over the surface of another body. In it there is no actual movement of the body.
Rolling friction : It is the force of friction that exists between two surfaces when a body rolls over the other body.

E. Long Answer Type Questions :

- Ans.** 1. When we push an object placed on a table with a small force, the object does not move at all. It means that the surface of contact of object and table exerts some force in a direction opposite to that of the push. Thus, when a block tends to move on the surface of a table, a force begins to act which opposes the motion of block on the table. This opposing force is called the force of friction or frictional force or simply friction. When a ball rolls on the ground, it slows down and finally come to rest due to force of friction.
Similarly when we stop our bicycle or switch off the engine of car, their motions also get retarded due to friction. The force of friction always opposes

the relative motion between two surfaces in contact. Thus, frictional force is the contact force and only acts if the objects are touching each other.

2. According to the nature of the surface, friction is of following types :
 - (a) **Static friction** : Static friction is the frictional force that exists between two bodies so long as they are relatively at rest, even though an external force is acting upon them. It is the opposing force that comes into play when one body tends to move over the surface of another but actual movement has not started. Static friction must be overcome before an object can be set in motion.
 - (b) **Sliding friction** : When the body slides over the surface of another, then the friction acting is called sliding friction. The force of friction that exists between the surfaces in contact when one body slides over the surface of other body is called sliding friction.
 - (c) **Rolling friction** : When a body rolls over the surface of another body, the friction is called rolling friction, like wheels. The force of friction that exists between two surfaces, when the body rolls on the surface is known as rolling friction. Both sliding and rolling frictions are called dynamic friction. Rolling friction is less than sliding friction.
3.
 - a. **Walking** : We can walk only due to friction between the surface and our those of feet. Due to friction the surface produces a hindrance or opposing force. This keep our shoes intact on the ground and we are able to walk.
 - b. **Writing** : We are able to write because of the friction between our pen and paper. The pen holds on to the paper and we are able to write on it.
 - c. **Chewing the food** : When we eat food, our teeth produces a friction on food. Due to his, we are able to eat the food.
4. If there is no friction between any two surfaces in contact, then the present day civilization will be no more as we cannot even walk properly on the earth. There will be no fabrics and garments, no construction of buildings and no furniture, even no cooking, and no vehicles. But too much friction causes a heavy loss of energy, wear and tear of machinery.
Thus, the efficiency of machines will decrease tremendously. So, it is rightly said that friction is a necessary evil.

F. Higher Order Thinking Skills (HOTS) :

- Ans.**
1. This is because the piece of cloth reduces the friction between the table and the surface by acting as a lubricant.
 2. It is easier to push a mass on a rough surface rather than to pull it.

12 Sound



EXERCISE

Section-I

A. Tick (✓) the correct answer (MCQs) :

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

B. Fill in the blanks :

- Ans.**
1. All vibrating bodies produce **sound**.
 2. The part of the outer ear that is visible to us is called **pinna**.

3. The sound above **80db** becomes physically painful.
4. The shrillness of a sound is called its **pitch**.
5. **Unpleasant** sounds are called noises.

C. Write true or false :

- Ans.** 1. false 2. false 3. true 4. true 5. true
6. false 7. true

D. Tick (✓) the odd-one out giving reason :

- Ans.** 1. Amplitude of vibration, Quantity of vibrating air, Frequency, **Decibel** ✓
Reason : It is the measurement of sound. Rest are the factors on which sound depends.
2. Eardrum, Oval window, **Multiple refraction**, Auditory nerves ✓
Reason : It is not a part of ear. Rest are.
3. Hearing loss, High blood pressure, Physical pain, **Noise** ✓
Reason : It is not an effect of loud noise. Rest are.
4. Sound, Water, **Vacuum**, Steel, Air. ✓
Reason : Sound cannot travel through it.

E. Write one word for the following :

- Ans.** 1. audible 2. larynx 3. loudness 4. sound waves

Section-II

A. Very Short Answer Type Questions :

- Ans.** 1. 20 Hz to 20,000 Hz
2. Unpleasant sounds are called noise.

B. Short Answer Type Questions :

- Ans.** 1. Sound is produced by vibrations.
2. This is so because in that case a type of vacuum is created around it. And sound waves cannot travel in vacuum.
3. Sound can travel through a solid, liquid and gas but not vacuum because sound needs medium for propagation.
4. Pitch is the shrillness of a sound. Loudness is the effect of sound energy on our ears. It depends upon its amplitude. More the amplitude, louder is the sound.
5. Noise pollution can be defined as the release of unwanted sound in the atmosphere.

C. Define the following terms :

- Ans.** 1. **Audible range** : A human ear can hear sounds having frequencies between 20Hz and 20,000 Hz. This range is called audible range.
2. **Speed of sound** : Speed of sound is the distance travelled by the sound divided by time taken.
3. **Time period** : The time taken by the bob of the pendulum to complete one oscillation is called its time period.
4. **Frequency** : Frequency is defined as the number of oscillations made by a vibrating body in one second.

D. Differentiate between the following :

- Ans.** 1. **Soft sounds** : These are those sounds that are low in loudness and do not hurt our ears.
Loud sounds : These are those sounds that high in loudness and are extremely harmful to our ears.

2. **Sound** : It is a sensation caused in the ear by the vibration of the surrounding air or other medium.

Noise : It is an unpleasant sound.

E. Long Answer Type Questions :

- Ans.** 1. The inner ear is connected to the middle ear through a small opening. The inner ear is filled with a fluid. When this fluid vibrates, it excites tiny hair in the inner ear. These hair transform the vibrations into electrical impulses, which are then transferred to the brain via the auditory nerve. This is how we 'hear' a sound.
2. All sounds that we hear are not the same. We can distinguish between different sounds on the basis of the following characteristics :

(i) Loudness

(ii) Pitch

(iii) Quality

(i) Loudness

It is the characteristic of sound which distinguishes a feeble sound from a loud one of the same frequency. Loudness of a sound depends on the amplitude of the vibration or oscillation. It is measured in decibels (dB).

Vibration or oscillation of a large amplitude produces a loud sound.

(ii) Pitch

The frequency of vibration determines the shrillness or pitch of a sound. The more is the frequency, the shriller is the sound.

Some examples of high pitch sounds (high frequency) are screaming of a child and buzzing of mosquitoes.

Some examples of low pitch sounds are roar of a lion and beating of a drum.

(iii) Quality

Quality of a sound is also called its tone. We can easily distinguish between the sounds produced by different sources. Let us see how does it become possible.

A tuning fork produces the sound of a single frequency. Most other instruments usually produce sounds (called notes) which consist of a basic or fundamental frequency and a number of overtones or harmonies of different loudness.

3. **Noise pollution can be controlled by the following ways :**

- Ways of reducing unwanted noise include designing quieter engines. For example, rotating shafts in machinery can be balanced better so that they do not cause vibration.
- Car engines are often mounted on metal brackets via rubber blocks which absorb vibrations and do not pass them on to the car body. Vehicle exhaust systems are fitted with 'silencers'.
- The use of sound-insulating material in homes, such as carpets and curtains, and double-glazed windows also helps.
- The farther away the noise originates the weaker it is, so distance is a natural barrier. For this reason, there are trees between houses and a noisy road. Trees absorb sound.
- Factories should be located away from residential areas.
- Minimise the use of loud speaker.
- Keep the volume of radio and television low.

F. Higher Order Thinking Skills (HOTS) :

- Ans.** 1. A bat detects its prey with the help of ultrasonic sound.
2. Sounds are classified as high-pitched sound and low-pitched sound on the basis of different pitches.

13 Chemical Effects of Electric Current



EXERCISE

Section-I

A. Tick (✓) the correct answer (MCQs) :

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

B. Fill in the blanks :

- Ans. 1. **Electricity** is the flow of electrons.
2. A solution of any electrolyte is called **electrolytic solution**.
3. The positively charged ion is called a **cation**.
4. A source of electricity is called a **anion**.
5. **Conductors** are the materials which allow electric current to flow through them.

C. Write true or false :

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

D. Tick (✓) the odd-one out giving reason :

- Plug, **Conductor**, Bakelite, Insulator
Reason : It is not insulator. Rest are
- Sugar, Urea, **Sulphuric acid**, Benzene
Reason : It is an electrolyte. Rest are non-electrolyte.
- Plastic, Wood, Distilled water, **Metal**
Reason : It is a conductor. Rest are insulators.
- Current**, Voltmeter, Electrolytic cell, Ammeter, Battery
Reason : It is electricity. Rest are instruments.

E. Write one word for the following :

- Ans. 1. Electrolysis 2. Conductor
3. Electrolytic refining 4. Cathode

Section-II

A. Very Short Answer Type Questions :

- Ans. 1. Voltmeter is an instrument that measures electric potential.
2. Do yourself

B. Short Answer Type Questions :

- Ans. 1. A metallic conductor is a body that allows current to go pass through it.
2. Electrolyte is a liquid which contains ions and can be decomposed by electrolysis.
3. Do yourself
4. Pure water is a bad conductor of electricity. To make the water an electrolyte, a small amount of sulphuric acid is added to it. The resulting solution is called acidulated water.

The acidulated water is taken in a voltmeter consisting of platinum electrodes. A test tube filled with acidulated water is inverted over each electrode. Electrolysis is carried out by passing an electric current through the electrodes.

Hydroxyl ions (OH) move towards the anode and lose one electron each to become OH atoms. These OH atoms combine to form water, and oxygen gas is liberated.

During the passage of electricity, for every one volume of oxygen liberated at the

anode, two volumes of hydrogen gas are liberated at the cathode.

5. The process of depositing a thin layer of any superior metal over an object of a cheaper metal, with the help of electric current is called electroplating. For example, deposition of silver on brass or copper objects and that of copper nickel, chromium etc., on objects made of iron is done by electroplating.

C. Define the following terms :

- Ans.**
1. **Electrolysis :** Electrolysis is the process by which decomposition of a compound into its components takes place by the passage of electric current.
 2. **Electrolytic refining :** Certain metals like copper, zinc, lead are also purified by using electrolysis. For this, the impure metal is made the anode while a thin strip of pure metal is taken as the cathode. This is called electrolytic refining.

D. Differentiate between the following :

- Ans.**
1. **Electrolysis :** A substance which gives ions when melted or dissolved in water is called an electrolyte.

Non-electrolyte : A substance which does not give ions when melted or dissolved in water is called a **non-electrolyte**.

2. **Cathode :** It is the electrode at which current leaves the solution.

Anode : It is the electrode at which electricity enters the solution.

E. Write detailed answers of the following questions.

- Ans.**
1. **Aim :** To electroplate a stainless steel spoon with copper metal.

You need : A stainless steel spoon, copper sulphate solution, beaker, copper and connecting wires and battery.

Procedure : Take some copper sulphate solution in the beaker. Connect the copper rod to the anode, i.e. positive terminal of the battery, and the stainless steel spoon to the cathode or the negative terminal of the battery with the help of the connecting wires. Then, let the current flow through the setup for at least 45 minutes. What do you observe?



You will notice a uniform layer of brown coating on the spoon. This layer is of copper which has got deposited on the spoon.

2. The chemical effect of electric current is the phenomenon of causing chemical changes by passing electric current. When an electric current is passed through a solution of a substance or in its molten state, the substance undergoes a chemical reaction and breaks up into its constituents. This process of decomposing (breaking up) a substance into its constituents by the passage of an electric current is called electrolysis. Electrolysis works only with those substances that can be melted or dissolved in water and conduct an electric current.

- The substances which in their water solution or in the molten state can conduct an electric current and decomposed as a result of it are called electrolytes.
- The substances which in their water solution or in the molten state cannot pass an electric current are called non-electrolytes.

3. The principle of electrolysis is employed in the following processes :

Manufacture of industrial chemicals

- Extraction of metals
- Refining of metals
- Electroplating

Manufacture of Industrial Chemicals

Many chemicals which are used in industry in large quantities are prepared by

electrolytic method.

Some of these are :

- (i) Sodium hydroxide, NaOH (caustic soda) and chlorine gas, Cl₂ (g) are prepared by the electrolysis of brine (20% common salt solution).
- (ii) Hydrogen gas, (H₂) is prepared by the electrolysis of acidified water, or 20% NaOH solution. Oxygen is obtained as by-product.

Extraction of Metals-Electrometallurgy

More electropositive metals, such as sodium (Na), potassium (K), calcium (Ca), magnesium (Mg), aluminum (Al), etc. cannot be obtained by carbon reduction process. These metals can be obtained by the electrolysis of their molten chlorides, hydroxides or oxides.

For example,

- Sodium and potassium are obtained by the electrolysis of their molten chlorides and hydroxides.
- Calcium and magnesium are obtained by the electrolysis of their molten chlorides.
- Aluminium is obtained by the electrolysis of its molten oxide (in the presence of some other compounds).

Refining of Metals

The metals obtained by chemical reduction methods generally contain many impurities. Such metals can be refined very easily by electrolytic method. The method of purifying metals by using electricity is called electrorefining. Metals, such as copper, silver, nickel, gold, aluminium, etc.,

Electroplating

The process of depositing a thin layer of any superior metal over an object of a cheaper metal, with the help of electric current is called electroplating.

For example, deposition of silver on brass or copper objects and that of copper, nickel, chromium etc., on objects made of iron is done by electroplating.

4. No, pure water does not conduct electricity. It is a bad conductor of electricity. To make the water an electrolyte, a small amount of sulphuric acid is added to it.

F. Higher Order Thinking Skills (HOTS) :

- Ans.
1. They do this because tap water is a good conductor of electricity and so it can spread the effect of electric current.
 2. No, it is not safe. He can be electrocuted.

14 Some Natural Phenomena



EXERCISE

Section-I

A. Tick (✓) the correct answer (MCQs) :

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

B. Fill in the blanks :

- Ans.
1. The static electricity can be produced by **rubbing**.
 2. There are only **two** kinds of electric charges.
 3. **Unlike** charges attract each other.
 4. An earthquake is defined as a sudden vibration or a tremor of the **Earth's crust**.
 5. Most destructive earthquakes are caused by dislocation of the crust called **tectonic plates**.

C. Write true or false :

Ans. 1. false 2. true 3. false 4. true 5. false 6. true

D. Tick (✓) the odd-one out giving reason :

- Ans.** 1. Glass rod, **Cotton cloth**, Positive charge on glass rod, Silk cloth
Reason : It does not produce a charge on rubbing.
2. Lightning, Lightning conductor, **Electroscope**,
Reason : It is not related to lightning.
3. Earthquake, Tsunami, **Richter scale**, Epicenter, Focal depth
Reason : It is an instrument to measure earthquake.
4. Hypocentre, **Volcanic eruption**, Earthquake, Seismic waves.
Reason : It is not related to earthquake.

Section-II

A. Very Short Answer Type Questions :

- Ans.** 1. Positive charge
2. The place from where an earthquake originates is called the seismic focus. It is the point from where the edges of the plates give way. The point vertically above the seismic focus is called epicenter.
3. By rubbing it with a charge body.
4. Most earthquakes occur at the boundaries where the tectonic plates meet.

B. Short Answer Type Questions :

- Ans.** 1. A lightning conductor is a device which is used to protect the tall buildings against lightning during a thunderstorm. It works on the principle of conduction of electricity through metallic substances.
2. An ebonite rod is a rod made of hard rubber. When rubbed with woollen cloth it acquires negative charge.
3. A lightning conductor consists of long, thick metal rod/strip having sharp spikes at its upper end. The spikes towards the sky are fixed at the highest point of the building. The lower end of the metal rod/strip is connected to a large copper (or aluminium) plate which is buried deep inside the earth. This is called Earthing. When a highly charged cloud passes over a tall building, it induces an opposite charge on the spikes. This charge quickly flows to the earth through the copper rod/strip. Thus, the lightning discharge is prevented and the building is saved from damage.
4. When a charged body is brought near an uncharged body, it attracts it towards it.
5. Earthquake is a sudden tremor in the earth's crust.
6. With the help of following experiment we can show that like charges repel while unlike charges attract each other :
Experiment : Take a glass rod, rub it with silk and suspend it freely from a silk thread. Bring near this suspended charged glass rod, another glass rod which is rubbed with silk. You will observe that the suspended glass rod is repelled.
Experiment : Take a glass rod and rub it with silk and suspend it freely by a silk thread. Bring near it an ebonite rod which is rubbed with cat's skin. You will observe that the glass rod is attracted by the ebonite rod.
7. Earthquakes can be caused due to various reasons :
- Volcanic eruptions
 - Man-made explosion
 - Dislocation of the crust
 - Movements of tectonic plates
8. Earthquake hazards include the following :

- Damage to buildings, roads, dams, bridges, etc.
- Deformation of the ground surface
- Fires resulting from breaking of the electrical power or gas lines.
- Occurrence of tsunamis (due to large earthquakes under oceans)
- Occurrence of landslides (in hilly areas).

C. Define the following terms :

- Ans.**
1. **Static electricity** : The electric charge on certain bodies where it cannot flow continuously.
 2. **Earthing** : This process of transfer of charges from a charged object to the earth is called Earthing or grounding.
 3. **Lightning conductor** : It is a device that is used to protect buildings from lightning. It consists of a thick copper rod connected to the ground below. The copper rod is connected to a large metal plate buried deep in the damp earth. When lightning strikes, the electricity flows safely to the earth, protecting the building.
 4. **Epicenter** : It is the point vertically above the seismic focus.
 5. **Richter scale** : It is the most common scale used to measure the magnitude of an earthquake.
 6. **Seismograph** : An instrument that records the data to show the magnitude of an earthquake.

D. Differentiate between the following :

- Ans.**
1. **Seismic focus** : It is the place from where an earthquake originates.
Epicentre : It is the point vertically above the seismic focus.
 2. **Lightning** : It is an electrical discharge. It moves through the clouds in a thunderstorm.
Thunderstorm : Loud sound caused due to compression of cold air by the expanding heated air.

E. Long Answer Type Questions :

- Ans.**
1. we need to take some precautionary measures to protect ourselves from lightning.
 - Do not stand under a tree. If the tree gets hit by lightning and catches fire you can be harmed.
 - Do not remain in an open place. Take shelter inside a building or a parked vehicle with all its doors and windows closed. The metallic frame of the vehicle will keep you safe (by acting as a lightning conductor). But take care not to touch the metal to avoid getting a shock.
 - If you are out in the open with no safe place around, squat down with your feet together and only let your feet touch the ground. This way you will reduce the chances of letting electric current to pass from the ground to your body.
 - Do not use electrical appliances when lightning strikes.
 - Stay away from water. Do not take a shower because water is a good conductor of electric current.
 - Do not go on the terrace or on the roof of any tall building.

2. **(a) Epicentre :** It is the point vertically above the focus on the surface of the Earth.
- (b) Focus :** The point where the edges of the tectonic plates give way is called the focus.
- (c) Magnitude :** The magnitude of an earthquake can be determined from data recorded by a seismograph. An earthquake of magnitude 2.0-4.0 is not too damaging. One of magnitude 4-8 is considered a moderate to severe earthquake. An earthquake of magnitude greater than 8-9 would be very severe.
- (d) Richter scale :** It is the most common scale to record the magnitude of an earthquake.
3. Here are some things you can do to protect yourself during an earthquake.
- If you are indoors, take cover under a heavy table or cot. Keep away from heavy objects that might fall.
 - If you are indoors in a public place, you should try to take cover under a sturdy object.
 - Running to the exit may cause a stampede, which could be very dangerous.
 - If you are outdoors, move away from buildings, electric poles, and trees, which could fall down.
 - If you are in a vehicle, stay inside. Vehicles should keep away from bridges, overpasses, and tunnels and avoid stopping under trees, light posts, power lines, or sign boards.
4. It is not in our power to prevent an earthquake. We can, however, take precautions to minimize the damage caused by it.
- Since most damage to human life is caused by falling of buildings, we should work towards making them earthquake resistant. The first factor to be considered is the type of soil on which a building is being constructed. Landfills and reclaimed areas are more dangerous as they may not have enough strength to support a building during an earthquake. Quality of the materials used for construction and the structure and design of the building are also important.
 - Buildings in earthquake-prone areas should use lightweight materials so as to reduce the loss of life in case these structures collapse in the event of an earthquake.
 - Ceiling fans, air conditioners, air coolers, etc., should be secured firmly. These objects can cause a lot of harm in case they fall down during an earthquake.

F. Higher Order Thinking Skills (HOTS) :

- Ans.**
1. Tsunami is more harmful than earthquake. It is so because it causes continuous damage for a period of time.
 2. This is so because our body is a conductor and it absorbs charge from the charged body.
 3. No, the spikes on umbrella can attract lightning towards us.



EXERCISE

Section-I

A. Tick (✓) the correct answer (MCQs) :

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

B. Fill in the blanks :

- Ans.** 1. The ray of light that gets reflected from the mirror is called **reflected ray**.
 2. **Eyes** is one of the most important sense organs.
 3. Iris has a tiny hole in the middle and is commonly called **pupil**.
 4. **Optic** nerve endings are sensitive to dim light, but not the colour.
 5. The method was based on sense of touch and was developed by a french man **Louis Braille**.

C. Write true or false :

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

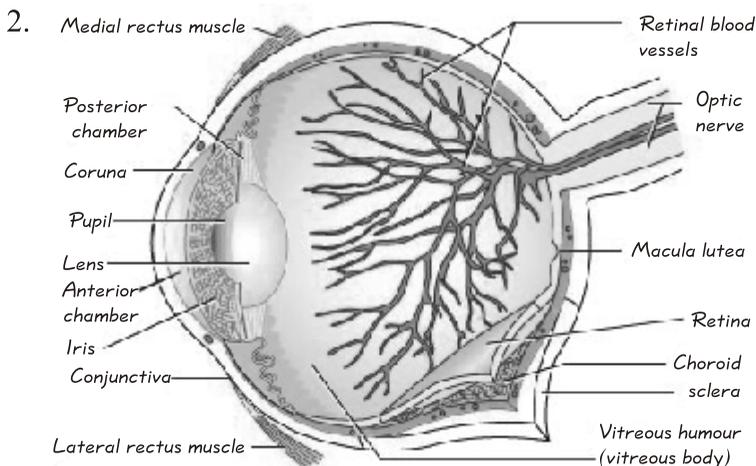
Section-II

A. Very Short Answer Type Questions :

- Ans.** 1. Scattering of white light in seven colours is called dispersion.
 2. When a parallel beam of light, after falling on a polished surface, reflected back in one direction it is called regular reflection.
 3. Violet, indigo, blue, green, yellow, orange and red.
 4. The main parts of eyes are sclerotic, cornea, choroid, optic nerve, restive, yellow spot, blind spot, crystalline lens, ciliary's muscles, iris, vitreous humour, aqueous humour, eyelids.

B. Short Answer Type Questions :

- Ans.** 1. When a ray of light gets reflected from a smooth surface, it obeys certain laws. These are called the laws of reflection.



Human eye

3. It is important to take care of our eyes because they are God's gift to us. We see the beautiful world around us by our eyes.
4.
 - Playing with sharp objects near our eyes.
 - Reading in very dim or very bright light.
 - Looking at the sun directly.
5. Iris plays a very important role in the functioning of the eye. It increases or decreases the size of the pupil to control the amount of light entering the eye.
6. Sometimes the lens becomes cloudy or opaque. This causes a condition called cataract. Cataract is a very common disease all over the world and causes blurred or dimmed vision.

C. Define the following terms :

- Ans.**
1. **Reflection of light :** The bouncing back of light from the surface of an object is called reflection of light.
 2. **Dispersion of white light :** The phenomenon of splitting of white light into its component colours is called dispersion of white light.
 3. **Blind spot :** It is a portion on the retina where the optic nerve enters the eyeball. It does not have any rods and cones and is insensitive to light. Images forming on this spot are not visible.
 4. **Braille cell :** A braille cell has one to six dots. The dot positions in a cell are arranged in two parallel columns of three positions each. Each cell signifies a specific dot pattern. In all 63 braille dot patterns are possible.
 5. **Defects of vision :** Nutritional deficiencies, wrong reading habits, age and genetic factors can sometimes cause defects of vision. Some of the defects of vision are : Short sightedness, long-sightedness and cataract.
 6. **Cataract :** Sometimes the lens becomes cloudy or opaque. This causes a condition called cataract. Cataract is a very common disease all over the world and causes blurred or dimmed vision.

D. Differentiate between the following :

- Ans.**
1. **Regular reflection :** When a parallel beam of light is incident on a plane and a highly polished surface, the reflected beam will also be parallel and hence, the whole light falling on the surface is reflected in a definite direction. Such a reflection is called regular reflection.
Irregular reflection : When a parallel beam of light is incident on a rough or irregular surface such as a wall or a piece of wood, the rays get reflected in all directions and the reflected light spreads over a wide area. Such a reflection is called irregular reflection or diffused reflection.
 2. **Short sightedness :** The formation of the image in front of the retina results in a condition called myopia or short sightedness. A person suffering from myopia cannot see far off objects very clearly. This defect can be corrected by wearing spectacles with concave lenses.
Long sightedness : The formation of the image behind the retina results in a condition called hypermetropia or long sightedness. A person suffering

from hypermetropia cannot see nearby objects very clearly. This defect can be corrected by wearing spectacles with convex lenses.

E. Long Answer Type Questions :

Ans. 1. The laws of reflection are as follows :

Law 1. The angle of reflection ($\angle r$) is equal to the angle of incidence ($\angle i$).

Law 2. The incident ray, the reflected ray and the normal at the point of incidence all lie in the same plane.

2. Characteristics of the Image Formed by a Plane Mirror

The image formed is :

- Erect
- Of the same size as that of the object.
- Virtual i.e. cannot be taken on screen.
- Laterally inverted. It means, right side of the object appears as the left side of the image and vice versa.
- As far behind the mirror, as the object is in front of it.

3. The structure and function of each part of eye is as follows :

Pupil : The inner aperture that we can see in the centre of the eye is known as the pupil. Pupil is like a hole through which light enters the eye.

Iris : It is the coloured part of the eye and is involved mainly in controlling the size of the pupil. The iris increases and decreases the size of the pupil to regulate the amount of light that enters through the pupil.

Sclera : The white part of the eye that we can see is known as the sclera. It is filled with a clear water fluid.

Cornea : It is a thin transparent tissue that covers the front of the eye.

Retina : Just behind the eyeball is a lining called the retina. It is the retina that is sensitive to light and has receptors called rods and cones. These rods and cones respond to light and generate impulses that can be read by the brain. The brain then sends back messages that tell us what we have seen.

Ciliary muscles : These control the focal length of the eye lens.

Lens : It is transparent tissue between the pupil and the retina. The lens helps in focusing the light that passes through the pupil into the eye. This helps in focusing the image on the retina, by bending the light rays.

Optic nerve : It connects the eye to the brain and carries impulses to and from the brain.

Blind spot : There is a portion on the retina where the nerve fibres enter the optic nerve. This portion does not have any rods and cones, and images falling on this portion of the retina cannot be 'seen'. This spot is called the blind spot.

4. • **Myopia :** You must have noticed some people holding a book or a newspaper very close to their eyes. This happens because they cannot see far off objects very clearly and are suffering from myopia. They can wear spectacles with concave lenses of appropriate focal length

of correct myopia.

- **Hypermetropia** : Some people can see objects that are far away clearly but nearby objects appear blur to them. This defect generally occurs in old age when the ciliary muscles become weak and are unable to thicken the eye lens. This defect is also called hypermetropia. It can be corrected by wearing spectacles with convex lenses.
5. Braille system is a well-known resource used by the visually challenged to read and write. The method was based on sense of touch and was developed by a French man Louis Braille. He used permutation (different placement) of six dots perforated on a paper to describe characters (French alphabet), mathematical, scientific and musical symbols. In Braille system, the six dots are arranged in two columns with three dots in each. One can read and write using this system. The codes were later generated for other languages as well to adopt the system all over the world.
 6. Every individual requires an adequate supply of nutrients in proper proportion in his diet for proper growth and health of the body. Many diseases are known to occur for want of adequate and balance diet. Night blindness is such a disease that occurs due to deficiency of vitamin A. A person suffering from night blindness, is unable to see in dim light. The spinach, carrots, cod liver oil, eggs, milk, curd, cheese, butter and ghee are rich in vitamin A. Fruits such as papaya and mango are also rich in vitamin A. Persons with weak vision must take these substances in sufficient quantity in their diet.

F. Higher Order Thinking Skills (HOTS) :

- Ans.** 1. This is so because reflection in new stainless steel plate is quite clear in comparison to that in the old plate.
2. The corresponding new reflected ray would be just opposite to it.

16 The Universe



EXERCISE

Section-I

A. Tick (✓) the correct answer (MCQs) :

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

B. Fill in the blanks :

- Ans.** 1. A group of stars is called a **constellation**.
2. **Sun** is the nearest star.
3. Constellations in Indian terminology are called **nakshatras**.
4. The solid heavenly bodies which revolve around the Sun are called **planets**.

5. **Saturn** is the Second largest planet in the Solar System.

C. Write true or false :

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

D. Tick (✓) the odd-one out giving reason :

- Ans.** 1. Mercury, Venus, **Saturn**, Mars, Earth
Reason : It is not a terrestrial planet. Others are.
2. Ursa major, Orion, **Alpha/centauri**, Cassiopeia
Reason : It is a star. Rest are constellations.
3. Earth, Jupiter, **Pluto**, Uranus, Neptune
Reason : It is a dwarf planet. Rest are planets.
4. Asteroid, **Star**, Comet, Meteors.
Reason : It is not a part of our solar system.

Section-II

A. Very Short Answer Type Questions :

- Ans.** 1. Moon
2. Innermost or terrestrial planets.
3. Outermost or Jovian planets.
4. Earth
5. Planets, moons, asteroids, meteors, comets.

B. Short Answer Type Questions :

- Ans.** 1. Celestial bodies are the heavenly bodies found in the universe.
2. A meteor is called a shooting star as it appears suddenly as a narrow streak of light across the sky.
3. A comet is a small member of the solar system made up of rocky material held together by frozen gases. It is like a dirty snowball.
4. A group of stars forming some kind of recognisable figures or patterns are known as constellation.
5. Astronomers feel that planet Mars is quite like the Earth because it is believed that Mars has large amount of water in the form of ice near its polar caps. This is often considered as an evidence of some sort of life on Mars.
6. The solar system is a family of sun that includes a large number of celestial bodies, such as planets, moons, asteroids and meteors, revolving around the sun.
7. A meteor (more commonly called a shooting star or falling star) appears suddenly as a narrow streak of light across the sky. Even though it may look like a falling star, the truth is that meteors are just pieces of dust burning up in the Earth's atmosphere. A meteor appears when a particle or chunk of metallic or stony matter called a meteoroid enters the Earth's atmosphere from the outer space.
8. The pole star can be located by looking in the northern sky. It is the brightest star in the sky.

9. Satellites are those bodies that revolve around the planets. So far 173 satellites have been discovered.

C. Define the following terms :

- Ans.** 1. **Constellations :** Constellations are group of stars that make an imaginary shape in the night sky.
2. **Planets :** Planets are the heavenly bodies that revolve around the Sun in a fixed path.
3. **Artificial satellites :** Artificial satellites are man-made objects continuously orbiting the Earth or some other body in space.
4. **Meteors :** These are the pieces of dust burning up in the Earth's atmosphere.
Meteorites : When meteors are able to reach the Earth's surface they are called meteorites.

D. Differentiate between the following :

- Ans.** 1. **Stars :** Stars are made of highly compressed gases. They are very big in size.
Planets : Planets are made of solid rocks, liquids and gases. They are comparatively smaller in size.
2. **Natural satellites :** These are the heavenly bodies that revolve around different planets. They are 173 in number.
Artificial satellites : These are man-made objects sent into space for different purposes. They are many in number.

E. Long Answer Type Questions :

Ans. 1. **Structure of Stars**

All the stars are made up of gases, mainly hydrogen and helium. When sometime in their life cycle, they undergo nuclear fusion reaction and start emitting heat and light. So, stars are heavenly bodies which produce energy by nuclear fusion reaction.

Movement of Stars

The Earth rotates west to east about an imaginary axis, so stars appear to move from east to west. Stand in the centre of big room and start rotating, you will see that all the objects in the room appear to move in the direction opposite to your motion. In the same way, stars appear to move from east to west. There is only one star that appears stationary called Pole Star or 'or Polaris.'

All the stars move around somebody with high speed. But when they are viewed from the Earth, they appear to be stationary. So, the distance between any two stars does not seem to change, though they are moving with high speed. The reason is that the distance of stars is so large that a small change cannot be noticed in few years of observations.

2. A group of stars forming some kind of recognisable figures or patterns are known as constellation.

Two of the very famous constellations are :

1. Ursa Major or Big Dipper or Saptarishi

A constellation consisting of seven bright stars can be seen clearly in the northern sky during the months of April to September.

It looks like a big ladle or a question mark. Stars 1 and 2 at the top of the ladle are called pointers because the line joining them points towards the "Pole star."

2. Ursa Minor or Small Dipper or Laghu Saptarishi

Ursa Major too has seven prominent stars just like Ursa Major. However, they are not as big and bright. 'Pole Star' forms the tip of the handle of Ursa Minor. Ursa Minor too is visible in the northern sky during spring and summer months.

3. The three things responsible for sustenance of life on the Earth are :
 - right distance from the sun.
 - right temperature range.
 - presence of water, a suitable atmosphere and a blanket of ozone which protects us from the harmful ultraviolet radiations.
4. The Sun is the centre of our solar system. It is the heaviest member of the solar system. Its mass is nearly 333,000 times that of the Earth. The temperature of the outer surface of the Sun is nearly 6,000°C, which is much cooler than the inner core of the Sun, where the temperature is of the order of 10⁷°C or 1,00,00,000°C. The Sun is maintaining this temperature at its centre due to nuclear reactions of hydrogen atoms, combining to form helium atoms. The Sun is a medium-sized star. It appears much bigger and different because it is much closer to us as compared to any other star. We are close enough to the Sun that we receive a good amount of heat and light from it, which is very important for life to exist. The light from the Sun reaches the Earth in 8 minutes and 20 seconds.
5.
 - A geostationary satellite is used for satellite communication. TV, Cellular phone, Fax etc., are a few of the services provided by satellite communication.
 - A sun-synchronous satellite is used for remote sensing. A remote sensing satellite passes over a particular location on the earth at the same local time.
 - Remote-sensing satellites are used for :
 - collecting forestry data
 - preparing wasteland maps
 - conducting ground-water surveys, drought assessment, estimation of crop yield/crop diseases.
6. The moon changes its size every night. Sometimes it looks like a complete bright circle and sometimes it is not visible at all.
The night we see the complete circular moon is called the full moon (poornima) night. Then onwards, every day the size of moon decreases

and after 15 days it disappears. The night we cannot see the moon at all is called the new moon (amawasya). After new moon, the size of the moon increases every day and once again it becomes full moon after 15 days. While the moon grows, we say it is waxing and when it shrinks back to a new moon, it is said to be waning. The various sizes of moon visible to us during the month are called phases of the moon.

F. Higher Order Thinking Skills (HOTS) :

- Ans.** 1. Western part.
2. We cannot heard the falling of a meteor on the moon. Sound does not propagate on the moon.

17 Pollution of Air and Water



Exercise

Section-I

A. Tick (✓) the correct answer (MCQs) :

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

B. Fill in the blanks :

- Ans.** 1. Any substance which causes pollution is known as a **pollutant**.
2. **Ozone layer** protects us from harmful ultraviolet radiations.
3. **Chlorine** kills germs making the water safe for drinking.
4. **Water** is available both on surface and under the ground.
5. The absorption of solar radiation by gases like carbon dioxide and methane is termed as **greenhouse effect**.

C. Write true or false :

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

Section-II

A. Very Short Answer Type Questions :

- Ans.** 1. Carbon dioxide.
2. Water which is free from germs and impurities and fit for drinking.
3. Compressed Natural Gas
4. DDT
5. Pollution in broad terms may be defined as an undesirable change in physical, chemical or biological characteristics of air, water and land that adversely affect living beings. Any substance which causes pollution is known as a pollutant.

B. Short Answer Type Questions :

- Ans.** 1. Ganga Action Plan is a project undertaken to purify the Ganga and safeguard it from increase pollution.

2. The natural Sources of air pollution are :
 - smoke from forest fires
 - dust from dust storms (especially in desert areas)
 - smoke, ash and poisonous fumes from volcanic eruptions
3. Water can be made safe for drinking by purifying it with different means such as chlorination, boiling and using filters.
4. Drinking water should be colourless and odourless.
It should also be free from
 - any suspended impurities
 - any harmful germs
 - large quantity of salts
 - any harmful salt such as nitrates, cyanides, urea, etc.
5. Common pollutants are carbon monoxide (CO), sulphur dioxide (SO₂), sulphur trioxide (SO₃), oxides of nitrogen (NO), mercury, dust particles, lead, arsenic and asbestos.
Burning of fossil fuels and smoke are the major sources of air pollutants.

D. Define the following terms :

- Ans.**
1. **Acid rain :** The oxides of sulphur and nitrogen emitted into the atmosphere by the factories and automobiles react with water vapour and oxygen present in the atmosphere to form sulphuric and nitric acids. These acids come down to the Earth's surface with the rainwater. This phenomenon is known as acid rain.
 2. **Smog :** The pollutants like nitrogen dioxide and hydrocarbons present in the atmosphere react with sunlight to produce a kind of air pollution known as photochemical smog.
 3. **Pollution :** Pollution is the contamination of Earth's environment with materials that interfere with human health, the quality of life, or the natural functioning of ecosystems.
 4. **Eutrophication :** Eutrophication is the enrichment of an ecosystem with chemical nutrients, typically compounds contain nitrogen, phosphorus, or both.

D. Distinguish between the following :

- Ans.**
1. **Clear air :** It is that air which is free from any type of impurities.
Polluted air : It is that air which is full of pollutants that is carbon monoxide, dust particles, SPM etc. This type of air is harmful to breathe.
 2. **Potable water :** This is the water that is free from impurities and is fit for drinking.
Polluted water : This is the water that is full of impurities and is not fit for drinking.

E. Long Answer Type Questions :

- Ans.**
1. i. Man is responsible for creating air pollution by his thoughtless and unplanned activities. Some of the important man-made causes of pollution are :

- Increasing human population
- Setting up of industries and factories
- Increase in number of vehicles using fossil fuels
- Deforestation and agricultural activities.

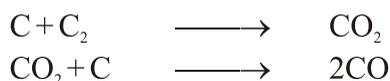
Rise in human population is directly responsible for all the other factors. It creates rise in demand for more goods leading to higher rate of industrial activity. There has been a tremendous increase in the number of vehicles of all sorts—cars, buses, scooters and trucks. Both factories and vehicles consume fossil fuels and release poisonous gases. Some major air pollutants are carbon dioxide, carbon monoxide, sulphur dioxide and soot.

ii. Water gets polluted in the following three ways :

- Toxic and poisonous wastes from house holds are thrown into water bodies
- Wastes released from industries include paints, dyes, chemicals and food activities. These contain toxic and poisonous chemicals that turn the water acidic killing aquatic plants and animals.
- Oceans are polluted by oil due to spills from tankers carrying petroleum and other oils across the seas.

2. Some air pollutants with their effects are :

Oxides of sulphur in low concentration cause the irritation of eyes and throat. In higher concentration, they increase mucus formation that obstructs the air passage when inhaling or exhaling. These oxides, along with the oxides of nitrogen are responsible for the acid rain. The acid rain harms the plants by changing soil acidity and the metallic structures such as statues, metallic bridges and building by causing their quick corrosion. Carbon monoxide is fatal to man. When inhaled, it causes headache, nausea and giddiness along with unconsciousness that can prove fatal. It is produced mostly by the incomplete combustion of fuels. This is why a worker in a workshop is advised not to work in a garage with doors closed and where the engine of a vehicle is running. Similarly, you are advised not to sleep in a room with burning coal (sigri) having the door and windows closed.



Although **carbon dioxide** is not considered as an air pollutant yet with the increasing human population and deforestation, its concentration in atmosphere has reached an alarming level to cause global warming because of greenhouse effect. The global warming if not checked, can cause the melting of polar ice (Fig) resulting in an increase water level in oceans, hence, submerging of small islands.

Ozone is a strong irritant. When inhaled, it causes haemorrhage and an excessive accumulation of the fluids in the chest.

The particles of **lead** present in automobile exhaust are harmful. These particles, when inhaled affect the blood production and cause the brain damage in children. It is for this reason that people are advised to use unleaded petrol instead of leaded petrol to reduce the emission of lead in atmosphere.

The **suspended particulate matter** (SPM) that includes the solid particles of dust, soot, carbon and asbestos cause severe damage to respiratory system. They are responsible for the major cause of respiratory diseases such as asthma, bronchitis and lung cancer in industrialized urban areas.

Air pollutants affect not only humans but also plants and domestic animals. The accumulations on soot on leaves surfaces reduce the rate of photosynthesis. Hydrogen sulphide, if present in air, affect the domestic animals such as dogs, cattle, pig and chickens in a poultry farm.

3. The absorption of solar radiation by gases like carbon dioxide and methane is termed as greenhouse effect. But, an increased concentration of carbon dioxide in the atmosphere leads to greater retention of heat, and consequently, an unnatural increase in the temperature of the Earth's atmosphere. This unnatural increase in the temperature of the Earth is known as global warming.

Global warming may lead to climatic changes like floods in low-lying areas and melting of the polar ice caps, raising the level of the sea.

4. People in big cities get purified river or lake water through a network of water pipelines.

1. Removal of Suspended Impurities

Water is pumped from a river or a lake into a large tank. Here, it is mixed with a small quantity of alum and allowed to stand for some time. The suspended particles of clay etc., settle down slowly at the bottom of the tank. The upper layer of water is then sent for filtration.

2. Filtration

The water after sedimentation is filtered through thick layers of sand and gravel. Here, the fine suspended impurities get removed.

3. Aeration

Air under pressure is then blown into the filtered water. The process called aeration, kills harmful microorganisms present in the filtered water.

4. Chlorination

The filtered and aerated water is chlorinated by adding chlorine to it. Chlorine kills all harmful germs. Thus, chlorination of water is done to make it free from all harmful microorganisms.

F. Higher Order Thinking Skills (HOTS) :

- Ans.**
1. We can do that by cutting out the consumption and use of fossil fuels. We should use clean fuels like CNG and PNG.
 2. This is so because CNG is a lead free fuel that does not pollutes the environment.