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8

## Chapter 1 : Crop Production and Its Management

### (A) Multiple Choice Questions (MCQ) :

Tick (✓) the correct answer :

1. (b)
2. (a)
3. (b)
4. (b)
5. (b)

### (B) One word question answers :

1. Cultivating plants for human use—for Food, Clothing is called Agriculture.
2. Factory made plant nutrient—is called Fertilizers.
3. Providing water to plants—is called Irrigation.
4. Plants sown in monsoon—are Kharif Crops.
5. Decomposed organic matter—is Manure.

### (C) Answer the following short questions :

1. Use of fertilizers is full of risks. Fertilizers tend to reduce the soil fertility, in the long run. Use of fertilizers can also lead to ground water pollution. Some harmful chemicals of fertilizers also reach human body through the food. But manures are not as harmful as fertilizers. It provides a lot of humus to the soil. It is also cost-effective. So, manures are better than fertilizers.
2. The method of replenishing the soil with nutrients is by crop rotation. In this method, different types of crops are grown instead of just one type of crop every year in the same field, this helps in replenishment of soil with nitrogen.
3. Cultivating of crop involves a series of activities like preparation of soil, sowing of seeds, applying adequate quantities of suitable manures and fertilizers, irrigation, removal of weeds, harvesting and storing of crops. These are collectively known as agricultural practices.
4. Fish is a major source of food in India. The rearing of fish on a large scale is called pisciculture. Honey bees are small insects that give us honey. The rearing of honey bees on a large scale is called Apiculture.
5. When plants of same kind are grown and cultivated at some place on a large scale, it is called a crop.

## TYPES OF CROPS

Different types of crops have different types of requirements in a particular area. A crop mainly grows well in one season, depending upon the climatic conditions such as temperature, humidity and rainfall. Based on these factors, there are two types of crops— (a) Kharif crops (b) Rabi crops.

- (a) **Kharif crops** : These are summer season crops. These are planted around June (during monsoon) and are harvested by October. Paddy (rice), maize, jowar, soybean, groundnut, cotton and pulses are some examples of Kharif crop.
- (b) **Rabi crops**—These are winter season crops. These are planted around November and are harvested by March and April. Pea, gram, mustard, wheat, potato, linseed and barley are some examples of Rabi crops.

### (D) Answer the following long questions :

1. Method of Irrigation can be either traditional or modern.

#### **Traditional methods of Irrigation**

Traditional methods utilize capital or human labour. These methods were cheaper but they were less efficient.

- ❖ **Kareen or dhekli**—A bucket or a boat shaped container is attached to a lever. The lever is pushed by feet so that the bucket lifts water from the water reservoir. The water is thus channelized through narrow drains. This is a cost-effective solution for small farmers.
- ❖ **Water pumps**—Motor driving water pumps are widely used for irrigation. The water pump is ideal for drawing water from tube wells. The pump can be operated by electricity or by diesel engines. In many villages, government also installed pumps so that the whole village can get irrigation facility.
- ❖ **Rahat or Water wheel**—It is also known as Persian wheel. There is a wooden wheel. Buckets are attached near the rim of wheel. When the water moves, buckets lift water and then the water is released in drains. The water wheel is operated by animal power.

**Modern methods of Irrigation**—The modern method of irrigation is better than traditional method of irrigation because with acute water shortage prevailing in many areas, we have to adopt more modern methods of irrigation. These methods utilize electric motors and thus use water more economically and efficiently. Some of these methods are:

- ❖ **Sprinkle method**—It consists of a main pipe, to which many pipes are arranged in series. These pipes have rotating sprinkle nozzles to right angles. When water is flowing through the top of the main pipe, it enters into the attached pipes and comes out in the form of sprinkles through the nozzles. At times, fertilizers or pesticides are also mixed with water and sprayed. This method is useful in areas where water is available in small quantities like deserts.
- ❖ **Drip System**—The water is allowed to flow in drops near the roots of the plant. This saves a lot of water which otherwise evaporates from the field. It is one of the best methods of irrigation in places where water is scarce.

## 2. Methods of sowing seeds

- (a) Manually ( by using hands)
- (b) Mechanically ( by using a seed drill)
- (a) **Manually**—Seeds are scattered by hands and it is called broadcasting. In this method, the seeds are scattered in the field by the farmer in standing position.
- (b) **Mechanically**—A seed drill has a funnel shaped opening leading to long tubes and these tubes are attached to a plough. Seeds are put into the funnel. As the plough makes furrows in the soil, the seeds are deposited, at right distance and right depth, in the soil by the drill. Sowing of seeds using a seed drill is better than broadcasting as the seeds are sown at regular intervals and at a proper depth. Moreover, this method of sowing is much faster and economical in comparison to broadcasting.

## 3. Preparation of soil

This is the first step in raising a crop. We know that the top soil is the most fertile layer of the soil. It has to be loosened and aerated so that the roots are able to penetrate deeper. This process of loosening and turning the soil is called ploughing or tilling. This is done by a wooden or an iron plough. Ploughing in bigger field is done by using tractor driven cultivator, whereas for smaller fields, animals are used for this purpose. First ploughing is done on dry land then afterwards large soil lumps are further broken down into small pieces using a wooden or iron plank. This is called levelling. After ploughing the soil is levelled and furrows are made. If the soil is very dry, it may need watering before ploughing. The ploughed field may have big pieces of soil called crumbs. It is necessary to break these crumbs with a plank. The field is levelled for sowing as well as for irrigation purposes. The levelling of soil is done with the help of a leveller. Sometimes, manure is added to the soil before tilling. This helps in proper mixing of manure with soil. The soil is watered before sowing is carried out.

### **Advantages of ploughing and levelling of soil :**

- (i) Loose soil allows easy penetration of roots.
  - (ii) It lets air and water percolate very easily.
  - (iii) It helps in turning the soil inside out so that even distribution of nutrients will take place.
  - (iv) Loosening of soil allows easy mixing of fertilizers.
  - (v) Levelling helps in preventing soil erosion.
  - (vi) Levelling also prevents water logging and helps in uniform irrigation of the land.
4. **Manure**—Manure is obtained from the decomposition of plant or animal waste. Plant waste and animal waste are dumped in pits. They are allowed to decompose. Once everything decomposes, manure is ready. The material formed after decomposition is called compost. Microorganisms play an important role in decomposition.

**Fertilizers**—Plant nutrients which are made in factories are called fertilizers. A fertilizer is a chemical substance which is rich in a particular nutrient. Urea, Ammonium Sulphate, potash, NPK (nitrogen, phosphorus, potassium) and super-phosphate are some examples of fertilizers. Fertilizers are very useful because they help in getting rich harvest.

5. (a) **Harvesting** : When the seeds ripen on the plants, they are cut with the help of sickle and gathered from the field. This process of cutting (reaping) and gathering of a mature (ripe) crop is called harvesting. Harvesting is done either manually with sickle or using a machine called the combine harvester. Combine harvester combines and complete all the process of harvesting such as reaping, threshing and winnowing.
- (b) **Storage Of Grains** : Not all the grains produced after one harvest can be used at one go. Most part of it needs to be stored for future use. To prevent damage from moisture, insects, rodents and microorganisms there should be proper storage of grains. In traditional method, silos are used for grain storage. Silos are usually made of split bamboo and coated with a layer of clay. Nowadays grains are also stored in metallic containers. Farmers put dried neem leaves in stored grains to prevent the growth of pests and micro-organism. Special chemical treatment is applied when grains are stored in big warehouses.
- (c) **Animal Husbandry**—The rearing of animals on a large scale for food is called animal husbandry. Rearing involves caring, feeding and breeding of farm animals and keep them free from diseases. Animals re-raised in farms.

**(E) Fill in the blanks with the given words below :**

- |                 |                    |           |
|-----------------|--------------------|-----------|
| 1. food         | 2. ploughing       | 3. crumbs |
| 4. broadcasting | 5. excess of water | 6. roots  |

**(F) Write true or false :**

- |          |          |         |         |         |
|----------|----------|---------|---------|---------|
| 1. False | 2. False | 3. True | 4. True | 5. True |
|----------|----------|---------|---------|---------|

**(G) Match the following :**

- |                          |                                |
|--------------------------|--------------------------------|
| 1. Apiculture—honey bees | 2. Harvesting—reaping of crops |
| 3. Manure—plant nutrient | 4. Weed—unwanted plants        |
| 5. Fish—pisciculture     |                                |

**(H) Activity :**

**Do yourself.**

## Chapter 2 : Microorganisms: Friends and Foes

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**(A) Multiple Choice Questions (MCQ) :**

Tick (✓) the correct answer :

- |        |        |        |        |        |
|--------|--------|--------|--------|--------|
| 1. (c) | 2. (a) | 3. (b) | 4. (b) | 5. (c) |
|--------|--------|--------|--------|--------|

**(B) One word question answers :**

- One communicable disease—is Cholera.
- Itching on feet is known as—Fungi.
- Cholera is caused by—Vibrio Cholera.
- Fungus used in bakeries—Yeast Moulds.
- During treatment of sewage, bacteria produces—Sludge.

**(C) Answer the following short questions :**

1. There are numerous organisms that live around us but are not visible to us. They are so small that they cannot be seen with the naked eyes and can only be seen through a microscope. Due to their extremely small size these are called microorganisms or microbes.
2. **Types of microorganisms**  
Some microorganisms are single celled and some are multicellular. Microorganisms are classified into five major groups as follows : Bacteria, Fungi, Protozoa, Algae and Viruses.
3. **Vaccination**  
Microbes cause diseases which are cured with the help of certain other microbes which plays an important role in making antibiotics. Some bacteria and fungi are used for preparing medicines called antibiotics such as streptomycin, erythromycin, amoxycillin and penicillin. Antibiotics are the medicines that kill or prevent the growth of harmful microorganisms.
4. **Protozoa**—Protozoa are unicellular animals. Cell wall is absent in Protozoa cell. They are heterotrophs and most of them are parasites. Amoeba is a good example of Protozoa. Amoeba lives in freshwater and is not a parasite. Amoeba has a unique ability to change shape as per need. Entamoeba and plasmodium are examples of parasitic protozoa.  
**Algae**—The green slimy patches which are often found near ponds, ditches or hand pumps, are formed by algae. Algae can be unicellular or multicellular. Unicellular algae can live alone or can live in colonies. Most of the algae are filamentous in shape. The green colour of algae shows that chloroplast is present in them and hence, they are autotrophs and make their own food. On the basis of the pigments, algae are classified as green algae, brown algae and red algae.
5. (a) **Bacteria**  
(i) bacilli (rod-shaped), cocci                      (ii) vibrio (comma-shaped),  
(b) **Fungi**  
(i) fungi are single-celled or multicellular organisms.  
(ii) Yeast, moulds, Penicillium, aspergillus  
(c) **Protozoa**  
(i) Amoeba    (ii) Entamoeba  
(d) **Algae**  
(i) Spirogyra,    (ii) Chlamydomonas  
(e) **Viruses**  
(i) TMV    (ii) HIV

**(D) Answer the following long questions :**

1. **Microorganisms as our friends** : Without any conscious effort, human beings are very closely associated with the number of microbes in their surroundings, many of them are great friends of men. Different microorganisms are used for various purposes: flight for making dairy products and for medicines, cleaning the environment and increasing soil fertility.

**Microbes as our foes :** Some microbes can cause illness in humans, plants and animals. They also spoil food. The microorganisms causing diseases in humans are called pathogens and are commonly known as germs. The microbial diseases, that can spread from infected person to a healthy person through air, water, food or physical contact, are called communicable diseases.

2. **For medicinal purpose vaccination :** Vaccines are prepared with dead or weakened microbes which cause the same disease. These are then called antigens. When they are introduced in our body, the body starts fighting and produce antibodies. Anytime in future, if the microbe responsible for the disease earlier enters the body, the body remembers how to fight that disease. The introduction of a small amount of antigen is called inoculation. Vaccination has successfully eradicated many deadly diseases like smallpox and attempts are being made towards eradication of polio, measles, mumps, rubella, chicken pox etc.
3. **Conditions for the growth of microorganisms :** Microorganisms grow very fast under most humid conditions and then optimum temperature range of 25° C to 40° C.

**Here are some ways in which harmful microbes spread :**

- (i) By direct contact with an infected person.
  - (ii) Through sneezing, coughing, etc.
  - (iii) Through carriers or vectors like housefly, mosquitoes and many more.
  - (iv) Contaminated food, water and air.
  - (v) Through bite of an animal.
4. **Food Preservation :** Some food items have to be consumed immediately as they are perishable and susceptible to spoilage by microorganisms. But by using certain food preservation techniques we can prevent the growth of microbes and can use them for longer duration. Food can be preserved using many methods such as sun drying, adding preservatives, refrigeration and freezing, pasteurization and heating and using air tight packaging containers.
  5. (a) **Bacteria**—Bacteria are unicellular organisms. Cell wall is present in bacteria. Bacteria are usually heterotrophs, but some of them are autotrophs. Bacteria are found everywhere. Bacteria are classified as prokaryotes. In prokaryotes, chromosomes are not bound by membranes. Bacteria can be classified on the basis of their shapes which are as follows bacilli (rod-shaped), cocci (spherical-shaped), vibrio (comma-shaped), spirillum (spiral-shaped).
  - (b) **Fungi**—Fungi are single-celled or multicellular organisms. They are found mostly in warm and humid places. Yeast, moulds, Penicillium, aspergillus and mushrooms are examples of fungi. Except for mushroom, fungi are microscopic.
  - (c) **Viruses**—Viruses are microorganisms that can be seen only through an electron microscope. Viruses are much smaller than bacteria. They live and grow only inside living cells of plants and animals. Viruses have a variety of shapes. They may be hexagonal, spherical or rod shaped, polygonal, cubical etc. They do not have cytoplasm, nucleus or cell membrane. There is just a central core of RNA or DNA surrounded by sheath of protein coat. This protein coat is made up of regularly packed units called capsid. Bacteriophage, TMV and HIV are some examples of viruses.

**(E) Fill in the blanks with the words given below :**

- |                   |              |              |
|-------------------|--------------|--------------|
| 1. microorganisms | 2. fungi     | 3. algae     |
| 4. inoculation    | 5. pathogens | 6. poisoning |

**(F) Write true or false :**

- |         |         |         |          |          |
|---------|---------|---------|----------|----------|
| 1. True | 2. True | 3. True | 4. False | 5. False |
|---------|---------|---------|----------|----------|

**(G) Match the following :**

- |                                |                          |
|--------------------------------|--------------------------|
| 1. Salmonella—food poisoning   | 2. Yeast—fermentation    |
| 3. Rhizobium—nitrogen fixation | 4. Penicillin—antibiotic |
| 5. Malaria—plasmodium          |                          |

**(H) Activity :**

**Do yourself.**

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### Chapter 3 : Synthetic fibres and Plastics

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**(A) Multiple Choice Questions (MCQ) :**

Tick (✓) the correct answer :

- |        |        |        |        |        |
|--------|--------|--------|--------|--------|
| 1. (a) | 2. (a) | 3. (b) | 4. (c) | 5. (c) |
|--------|--------|--------|--------|--------|

**(B) One word question answers :**

1. First synthetic fibre—is Rayon.
2. First truly synthetic fibre—is Nylon.
3. Resembles silk in appearance—is Rayon.
4. Silk, jute, cotton, wool—are natural Fibres.
5. Plastic for one time use and cannot be moulded again—The ermosetting plastic.

**(C) Answer the following short questions :**

1. Rayon is discovered earlier than nylon, but nylon is considered truly synthetic fibre because Nylon is made from coal, water and air. Nylon is stronger, lighter and lustrous than rayon. The strength of nylon can be gauged from the fact that it is used in making parachutes and ropes.
2. The thread from which cloth is made is called fiber and the material produced by weaving and knitting textiles fibers is called fabric. Natural fibers like cotton, jute, silk, wool etc. and synthetic fibers such as rayon, nylon, polyester, etc. Besides clothes, fabrics are used for making many household articles like carpets, bags, ropes, etc.
3. **Plastic**—Plastics are synthetic materials that can be melted and moulded into different shapes. Like synthetic fibres, plastics are also polymers. In plastics, the arrangement of the individual units may be linear or cross-linked. Plastic is a material which can be moulded into various shapes and sizes. Plastic can be recycled, recoloured, melted and reused. There are uncountable plastic materials we use in our daily life like buckets, bottles, toys, boxes, bowls, switchboards, dinner sets, doors and so on.



4. **Thermoplastic**—The plastic which can be melted by heating and again molded into different shapes and sizes are known as thermoplastic. For example polythene, PVC (polyvinyl chloride), polystyrene, Teflon, etc.

**Thermosetting plastic**—Thermosets are also plastics in which materials are obtained by gently heating and then moulding. However, the moulded materials cannot be remoulded again and again. Thus, they are plastic for one time use and the molding is permanent. They are harder and stiffer than thermoplastic. Bakelite, melamine, formica, sunmica and urea formaldehyde are examples of thermosetting plastic.

5. Fibres are of two types :

- (i) **Natural Fibre**—The fibres which are obtained from plants and animals are called natural fibres. For example cotton, jute, silk, and wool.
- (ii) **Man-made fibre or synthetic fibre**—Man-made fibres are also known as synthetic fibres. For example rayon, nylon, polyester and plastic.

**(D) Answer the following long questions :**

1. **Natural fibre**—The fibres which are obtained from plants and animals are called natural fibres. Cotton and jute are obtained from plants and silk and wool are obtained from animals.

**Man-made fibre or synthetic fibre**—Man-made fibres are also known as synthetic fibres. They are made from chemicals obtained from petroleum (crude oil). .

2. **Structure of fibre**—All natural fibres are made from simple chemical molecules called monomers. The monomers join in large number to form a long chain of molecules called polymers. All polymers contain molecules of same substance join together to form a long chain or bigger molecule. The polymers are plastic in nature. They can be moulded into various shapes. The property when a substance can be moulded into various forms is called plasticity, and the substance itself is called plastic. The natural fibres are not produced in large quantities which could satisfy the increasing demand of increasing human population. This drawback in natural fabrics led scientists to use their knowledge of chemistry and technology to create fibres artificially. Chemists have learnt to combine simpler molecule into a long chain of a bigger molecule so as to form artificial fibres. These artificial fibres are called synthetic polymers

3. **Properties and uses of plastics**

- (i) Plastics do not corrode easily as they do not react with air and water. They are used for making toys, decorative items and as packing materials. They are used to store chemicals.
- (ii) Plastics have light weight, good strength and are easy to handle.
- (iii) They are lighter than metals, they are used in cars, aircrafts etc. in place of metals.
- (iv) Plastics are poor conductor of electricity and are used for making electrical switches, for covering electrical wires and appliances.
- (v) Plastics can be spun into fibres to make clothes and carpets.
- (vi) They were used for making table cloths, fashionable accessories, footwears, waterproof shoes, raincoats and bathroom curtains.



- (vii) Teflon is used to make non-stick cooking vessels.
- (viii)Plastics are strong, durable and corrosion free. Plastics are inflammable and therefore are a fire hazard.
- (ix) Plastics are chemically unreactive.
- (x) Being insoluble in water they are used to make bottles, buckets and containers for storing water and plastic cups and tumblers for drinking water.

**4. Some of the harmful effects of plastic on our environment are :**

- (i) The poly bags carelessly thrown here and there are responsible for clogging the drains and sewer lines.
- (ii) Many animals like cows while eating food waste from garbage, swallow polythene bags. This chokes their respiratory system or causes problem in their stomach and can lead to their death.
- (iii) Plastic waste thrown into water bodies, they cause water pollution and also harm aquatic life.
- (iv) When plastic wastes are burnt, they produce toxic gases and smoke that cause air pollution.
- (v) When plastics are buried in the soil, they prevent rainwater from seeping into the ground. This deprives plants growing in that area.

**3R's towards plastic created problems :** The most effective method to protect from the hazards of plastic is by following the three R's principles REDUCE, REUSE and RECYCLE.

- (i) Use of plastic bags should be banned and we should use other alternatives like cotton or jute bags or recycled paper bags.
- (ii) Reuse plastic bags as long as possible.
- (iii) Do not burn them with dried leaves and twigs.
- (iv) If required, we should use plastic articles that can be recycled. Recycling plastic is also one of the ways to reduce plastic wastes.
- (v) We should not throw plastic bags in water bodies, on roads sides and in parks.
- (vi) We should clean and dry plastic bags, plastic containers, plastic bottles for reuse as containers.
- (vii) The people need to be educated and made aware of ill effects of using plastic excessively.

**5. (a) Uses of Rayon—**

- (i) It is used for making clothing items like jacket, ties, suits, dresses etc.
- (ii) It is also used for making furnishing materials and car upholstery.
- (iii) Its long filaments are used for making reinforced automobile tyres.
- (iv) It is used for making gauze to cover wounds.

**Properties of Rayon**

- (i) It is soft, comfortable and highly absorbent.
- (ii) It is lustrous as silk.
- (iii) It is cheap and affordable.
- (iv) It is strong and easy to dye.

**(b) Uses of Nylon**

- (i) It is used for making fabric for clothing and woolen garments.
- (ii) It is used for making parachutes, mountaineering and fishing nets, tents and ropes.
- (iii) It is used for making strings for tennis rackets and tyre cords.
- (iv) It is also used for making household articles such as tooth brushes, zip fasteners, combs, hooks, socks, stockings and various small parts of machine such as washers, pulleys etc.

**Properties of nylon**

- (i) It is lightweight and wrinkle free material.
- (ii) It is water resistant and quick to dry.
- (iii) It is very strong and is one of the most elastic synthetic fibre.
- (iv) It is long lasting and lustrous.
- (v) Nylon is not acted upon by bacteria and fungi.

**(c) Uses of polyester**

- (i) It is used for making many useful materials like CD, plastic films, tarpaulin, umbrella and raincoat, file covers etc.
- (ii) It is used for making clothes, towels, upholstery, curtains, mats, cushion covers, bed sheets, bed covers, table covers etc.
- (iii) It is also used for making bottles and utensils.

**Properties of polyester**

- (i) It is easy to maintain.
- (ii) It is stretching and shrinking resistant.
- (iii) It is lightweight, tear resistant and wrinkle proof and can be washed easily.

**(E) Fill in the blanks with suitable (given) words :**

- |          |                      |              |
|----------|----------------------|--------------|
| 1. rayon | 2. non-biodegradable | 3. cellulose |
| 4. poor  | 5. ester             | 6. water     |

**(F) Write true or false :**

- |          |          |         |         |          |
|----------|----------|---------|---------|----------|
| 1. False | 2. False | 3. True | 4. True | 5. False |
|----------|----------|---------|---------|----------|

**(G) Match the following :**

- |                                    |                              |
|------------------------------------|------------------------------|
| 1. Rayon—artificial silk           | 2. Acrylic—synthetic wool    |
| 3. Teflon—non-stick cooking vessel | 4. Plastic—non-biodegradable |
| 5. Polyester—terrycot and PET      |                              |

**(H) Activity :**

**Do yourself.**

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**Chapter 4 : Metals and Non-Metals**

**(A) Multiple Choice Questions (MCQ) :**

Tick (✓) the correct answer :

- |        |        |        |        |        |        |
|--------|--------|--------|--------|--------|--------|
| 1. (c) | 2. (a) | 3. (a) | 4. (c) | 5. (c) | 6. (b) |
|--------|--------|--------|--------|--------|--------|

**(B) One word question answers :**

1. Produce sound on hitting—Sonorous metals.

2. Metallic shine over the surface—Lustre.
3. Dissolve in liquid solvent—Alkali Metals
4. Drawn into wires—Ductility.
5. Vision is not possible through the object—Opaque.

**(C) Answer the following short questions :**

1. **Metals**—A metal is a material that when freshly prepared, polished, or fractured, shows a lustrous appearance and conducts electricity and heat relatively as well. Metals are typically malleable or ductile. Some of the common metals used are iron, copper, silver, aluminium, nickel, magnesium, gold and mercury.
2. **Non-metals**—Non-metals are soft and dull in appearance. They are poor conductors of heat and electricity. They are not as strong as metals and are also not sonorous. The commonly used non-metals are carbon, chlorine, sulphur, oxygen, phosphorus and nitrogen.
3. **Noble metals**—The noble metals are metals that are resistant to corrosion and oxidation in moist air. They tend to be precious, often due to their rarity in the Earth's crust. The noble metals are most commonly considered to be rhodium, silver, iridium, platinum and gold.
4. **Displacement reaction of metals**—A displacement reaction is one in which a more reactive metal displaces the less reactive metal in a reaction. Different metals have different chemical reactivities. Some metals are very reactive and some are less reactive.
5. **Rusting of iron**—Rusting of iron usually a red oxide formed by the reaction of iron, when iron is exposed to oxygen in the presence of water or air moisture. Zinc is used to galvanize iron objects to prevent them from rusting.

**(D) Answer the following long questions :**

**1. Uses of some metals are—**

- (i) The lustrous metals are used to make Jewellery. Gold and silver are also used to make very thin sheets to decorate sweets.
- (ii) Aluminium and copper are used for making electric cables. Aluminium is used for making aircraft parts, packaging foils and even in paints.
- (iii) Metals like copper, aluminium and iron are used in making utensils, kitchen ware, gas stove, electric iron, machinery and automobile parts.
- (iv) Gates, railings, agriculture implements, automobiles, nails, pipes, medical tools, bolts are made up of iron. Iron is also used in construction works.
- (v) Lead is used to make car batteries. Its compounds are used in the manufacture of paints.
- (vi) Mercury is used in thermometers and barometers.
- (vii) Zinc is used in making dry cells and also to galvanize iron objects to prevent them from rusting.

**Uses of some non-metals are—**

- (i) Graphite is used in pencils and in dry cells. Powdered graphite is used as a lubricant.

- (ii) Phosphorus is used in Fireworks industry.
- (iii) Sulphur is used in manufacture of chemical compounds, matchsticks, dyes, car powder, explosives, batteries, fertilizers etc.
- (iv) Hydrogen and oxygen is used in cutting and welding of metals. Oxygen also supports combustion reaction.
- (v) Noble gases like Helium are used to fill balloons and argon is used to fill in the bulbs.
- (vi) Oxygen is widely used for artificial respiration.

**2. Metals have the following physical properties—**

- (i) **Hardness**—Generally, all metals are hard and strong. Metals like sodium and potassium are soft solids and can be cut with a knife.
- (ii) **Ductility**—metals can be drawn into thin wires. The property, by which a substance can be drawn into wires, is called ductility. Sodium, potassium, zinc, arsenic, and calcium are exceptions.
- (iii) **Lustre**—Metals usually have lustre. Most metals have a brilliant shine over the surface. This metallic shine is called lustre.
- (iv) **Physical state**—Metals are solids generally at room temperature. They have very high melting and boiling points. Mercury (Hg) and gallium are exceptions as they are liquids at room temperature.
- (v) **Malleability**—the property due to which a substance can be beaten into thin sheets is called malleability. Metals like gold, silver, copper, etc... are generally malleable whereas zinc, arsenic and antimony are exceptions.
- (vi) **Sonorous**—metals produce sound on hitting with a metal rod. This shows that metals are sonorous.
- (vii) **Colour**—all the metals have a silver grey colour, except gold which has yellow colour and copper has reddish orange colour.
- (viii) **Solubility**—metals usually don't dissolve in liquid solvents.
- (ix) **Opaque**—metals are opaque substances. We cannot see through them.
- (x) **Conductivity**—metals are generally good conductors of heat and electricity. Most metals allow heat and electricity to pass through them easily. Silver is the best conductor of heat and electricity, whereas bismuth and tungsten are poor conductors.

**The physical properties of non-metals are—**

- (i) **Hardness**—Non-metals are generally not hard. Carbon, in the form of diamond, is the hardest substance known.
- (ii) **Ductility**— Non-metals are not ductile.
- (iii) **Lustre**—Non-metals have no lustre. However, iodine and graphite have lustre.
- (iv) **Physical state**—Non-metals are generally brittle solids, liquids or gases. They change into vapour state at fairly low temperature. Carbon, silicon and boron are exception and change into vapours at a very high temperature.
- (v) **Malleability**—Non-metals are non-malleable. They are rather brittle, hence, on applying force, break into pieces.

- (vi) **Sonorous**—Non-metals have no sonority that is they do not produce metallic sound when struck with a substance.
- (vii) **Melting and boiling points**—Non-metals generally have low melting and boiling points. Carbon, silicon and boron have high melting and boiling points.
- (viii) **Density**—Non-metals generally have low density. However, diamond is almost as heavy as aluminium.
- (ix) **Conductivity**—Non-metals are usually bad conductors of heat and electricity. However, carbon in the form of graphite, is a good conductor of electricity.

### 3. Displacement reaction of metals

Different metals have different chemical reactivities. Some metals are very reactive and some are less reactive. Based on all these reactivities, a reactivity or activity series is prepared. In this reactivity series the most reactive metal is placed at the top whereas the least reactive metal is placed at the bottom.

A displacement reaction is one in which a more reactive metal displaces the less reactive metal in a reaction. For example, Iron, being more reactive than copper replaces copper from the aqueous solution of copper sulphate. The blue solution of copper sulphate turns green due to formation of ferrous sulphate.

Similarly, magnesium, which is more reactive than hydrogen, replaces it from the dilute aqueous solution of hydrochloric acid.

### 4. Chemical Properties of Metal.

Metals have the following chemical properties—

- (i) **Reaction with oxygen**—Metals form oxides by combining with oxygen. Metals donate electrons to oxygen molecules. Metallic oxides are basic in nature. The reactivity of different metals with oxygen is different from each other.
  - Metals like Sodium and Potassium reacts immediately with oxygen.
  - The reaction of copper with oxygen is very slow.
  - Metals like magnesium have to be heated before reaction with oxygen.
- (ii) **Reaction with water**—Metals form hydroxide and hydrogen gas is evolved, when they react with water. The reactivity of metals with water is different.
  - Sodium reacts with water at normal temperature. Its reaction with water is highly vigorous that is why it is kept under kerosene.
  - Potassium and Calcium too react with water forming potassium hydroxide and calcium hydroxide respectively.
  - Magnesium reacts with water only at a high temperature. The reaction takes place if the water boiled in the presence of catalyst like nickel or with steam.
  - Iron and Zinc are not affected even by hot water, but they react with steam.
  - Copper does not react with water even at high temperature and also not with steam.
- (iii) **Reaction with acids**—Usually metals react with dilute hydrochloric acid forming respective chloride and hydrogen gas.
  - With dilute sulphuric acid, they give sulphates and hydrogen gas.
  - Copper, silver and gold do not react with dilute hydrochloric acid.
- (iv) **Reaction with hydrogen**—Certain active metals like Sodium, Potassium and Calcium combined with hydrogen to form their respective hydrides.

(v) **Reaction with chlorine**—Metals react with chlorine to form their respective chlorides.

### 5. Chemical properties of non-metals

Chemical properties of non-metals are—

1. **Reaction with oxygen**—Non-metals react with oxygen to form oxides. Some of these oxides form acids when dissolved in water.
2. **Reaction with water**—Non-metals do not react with water.
3. **Reaction with acid**—Non-metals do not remove hydrogen from acids. They accept electrons instead of supplying them. However, concentrated nitric acid reacts with Sulphur on boiling to form Sulphur Dioxide gas, Nitrogen dioxide gas and water.
4. **Reaction with hydrogen**—Non-metals, with hydrogen form their respective hydrides. Chlorine reacts with hydrogen to give hydrogen chloride. Carbon reacts with hydrogen to form methane.
5. **Reaction with chlorine**—Non-metals form chloride when they react with chlorine.

### 6. Uses of Non-metals

- (i) Graphite is used in pencils and in dry cells. Powdered graphite is used as a lubricant.
- (ii) Phosphorus is used in Fireworks industry.
- (iii) Sulphur is used in manufacture of chemical compounds, matchsticks, dyes, car powder, explosives, batteries, fertilizers etc.
- (iv) Hydrogen and oxygen is used in cutting and welding of metals. Oxygen also supports combustion reaction.
- (v) Noble gases like Helium are used to fill balloons and argon is used to fill in the bulbs.
- (vi) Oxygen is widely used for artificial respiration.

### (E) Fill in the blanks with the given words below :

- |               |                     |             |
|---------------|---------------------|-------------|
| 1. sound      | 2. good conductors, | 3. electric |
| 4. appearance | 5. non-metals       | 6. cutting  |

### (F) Write true or false :

- |          |          |         |         |          |
|----------|----------|---------|---------|----------|
| 1. False | 2. False | 3. True | 4. True | 5. False |
|----------|----------|---------|---------|----------|

### (G) Match the following :

- |                                      |                                     |
|--------------------------------------|-------------------------------------|
| 1. Copper—reddish orange             | 2. Bromine—liquid non-metal         |
| 3. Graphite—lustrous non-metal       | 4. Sodium and potassium—soft solids |
| 5. Mercury and gallium—liquid metals |                                     |

### (H) Activity :

**Do yourself.**

### (A) Multiple Choice Questions (MCQ) :

Tick (3) the correct answer :

1. (b)      2. (a)      3. (c)      4. (b)      5. (b)      6. (b)

### (B) One word question answers :

1. **Formation of coal**—Carbonisation.
2. **CNG**—Compressed natural gas.
3. **Natural gas reserves**—Maharashtra, Rajasthan, Krishna Godavari Delta.
4. **Large plant of petroleum refining**—Petroleum refineries.
5. **Two fossil fuels**—Coal petroleum.
6. **Renewable resources**—Air, Soil, Water, Forest, Sunlight.

### (C) Answer the following short questions :

#### 1. Coal

Coal is black, solid fossil fuel which mainly consists of carbon. Coal occurs in many varieties based on the carbon contents—anthracite, bituminous, lignite and peat. The nature of coal formed depends on the depth to which the buried remains reached. The lower the remains sank, the higher the carbon content.

#### 2. Petroleum

Petroleum is a thick liquid trapped between rocks and under the ocean and is also called crude oil. The word petroleum is derived from the Greek word Petra which means rock and Oela which means oil. Crude oil is a dark brown or green coloured, viscous, foul smelling and flammable liquid. It is a mixture of different organic compounds most of which are hydrocarbons of various sizes. Smaller hydrocarbons are lighter and have lower boiling points than the larger molecules.

3. The process of formation of coal is called carbonisation. Coal was formed from the remains of plants which must have got buried due to some natural phenomena under the earth's crust.
4. On the basis of availability of resources, there are two types of natural resources—
  - (i) Inexhaustible natural resource
  - (ii) Exhaustible natural resource
    - (i) **Inexhaustible natural resource**—Such natural resources do not deplete over a period of time i.e, their supply is limitless. Inexhaustible natural resources are also known as renewable resources because these resources can be replaced by natural processes and forces. They will not be exhausted by human activities. Air, soil, water, forest and sunlight are some examples of inexhaustible natural resources.
    - (ii) **Exhaustible natural resource**—Such natural resources deplete over a period of time and their supply is limited. Exhaustible natural resources are also known as non-renewable sources of energy. These resources are consumed faster than nature can create them. Coal, petroleum, nuclear fuels and minerals are example of exhaustible resources.



5. **Fuel** : A fuel is a substance, which, when burnt releases a lot of energy in the form of heat or/ and light. We obtain most of the energy from various types of fuels. Diesel, petrol, kerosene, compressed natural gas, petroleum gas, liquefied hydrogen, coke, coal, wood etc. are various examples of fuel.

**(D) Answer the following long questions :**

1. **Formation of Coal** : The process of formation of coal is called carbonisation. Coal was formed from the remains of plants which must have got buried due to some natural phenomena under the earth's crust. Over the time, many layers of soil got deposited over it. These were compressed and got decomposed. These were subjected to heat and pressure from the top layers of the Earth, and the action of aerobic bacteria in the absence of air.
2. **Formation of Petroleum** : Petroleum is formed by the decomposition of marine organisms. When these organisms died, their bodies settle down at the bottom of the seas. These got covered under hundreds of feet of sand, clay and silt. After millions of years, in the absence of air, high temperature and high pressure, these remains got transformed into petroleum and natural gas. Petroleum is usually found about 3 to 4 kilometres below the ground level.

Use of fossil fuels is increasing with increase in population. So, these known fuels will last only for a few thousand years. We need to conserve the fossil fuels, keeping the limitation of fossil fuels in mind.

Burning of coal, oil and gas contributes to major environmental problems, releasing CO<sub>2</sub> gas. Accumulation of vast amount of CO<sub>2</sub> is the cause of global warming due to greenhouse effect and acid rain.

Global warming is creating many problems on earth. Normal weather pattern is highly disturbed because of global warming and it has resulted in more incidences of natural calamities. Acid rain is harmful for both flora and fauna. Apart from endangering flora and fauna, acid rain also harms Historical monuments.

Accidental spilling of oil on land and sea is poisonous and fire hazard. Oil spills at sea kill aquatic organisms destroying the aquatic organisms. Inhalation of oxides of nitrogen, sulphur, carbon monoxide etc., has been a cause of respiratory diseases and can be a trigger for major illnesses like cancer. Therefore, these fossil fuels should be used only when absolutely necessary.

4. **Uses of Coal**

- (i) Coal is used in the manufacture of synthetic petrol and synthetic natural gas.
- (ii) Coal is used to produce electricity in thermal power plants and also as fuel in various industries.
- (iii) In earlier times, coal is used to run steam engines.
- (iv) Coal is also used as domestic fuel.
- (v) Destructive distillation of coal gives more useful products, such as coke, coal tar and coal gas.

### Uses of Petroleum

- (i) Petroleum is used as a source of energy in the production of electricity.
- (ii) Being rich in combustible carbon, Petroleum is used in running of heat engines.

### Uses of Natural gas

- (i) Natural gas is used in electrical power generation.
- (ii) CNG is replacing diesel and petrol in public transport.
- (iii) It is also used as an industrial and domestic fuel.

- 5. Refining and fractional distillation of Petroleum :** Petroleum is a complex mixture of various hydrocarbons with different boiling points such as Petroleum gas, petrol, diesel, lubricating oil and paraffin wax. Therefore, it is necessary to separate petroleum into smaller fractions of hydrocarbons. Separation of the molecules is done by a process called refining. Hydrocarbons with boiling points within a certain range are grouped together into fractions. The various fractions are separated from one another in a fractional distillation column for fractioning tower. Petroleum refining is done in large plants called petroleum refineries. The process of fractional distillation starts with the heating of crude oil to a temperature of about 350°C. As it boils, the oil vapours pass through the column, losing it as it rises. The different fractions cool and condense at different places in the column according to their boiling points. Each fraction is separated off and distilled again to make it purer.

**(E) Fill in the blanks with the given words below :**

- |                  |                |                     |
|------------------|----------------|---------------------|
| 1. carbonisation | 2. destructive | 3. burning          |
| 4. coal tar      | 5. coke        | 6. synthetic petrol |

**(F) Write true or false :**

- |         |          |         |         |         |
|---------|----------|---------|---------|---------|
| 1. True | 2. False | 3. True | 4. True | 5. True |
|---------|----------|---------|---------|---------|

**(G) Match the following :**

- |  |  |
|--|--|
| 1. <b>Petroleum</b> —marine organisms          | 2. <b>Coal</b> —extracted by digging       |
| 3. <b>Formation of coal</b> —carbonisation     | 4. <b>Sunlight</b> —inexhaustible resource |
| 5. <b>Nuclear fuels</b> —exhaustible resources |  |

**(H) Activity :**

Do yourself.

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## Chapter 6 : Combustion and Flame

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**(A) Multiple Choice Questions (MCQ) :**

Tick (✓) the correct answer :

- |        |        |        |        |        |        |
|--------|--------|--------|--------|--------|--------|
| 1. (b) | 2. (b) | 3. (a) | 4. (c) | 5. (b) | 6. (a) |
|--------|--------|--------|--------|--------|--------|

**(B) One word question answers :**

1. Hottest part of flame—Outer most.
2. Luminous zone of flame—Middle zone.
3. A liquid fuel—That exists in liquid state in room Temperature.
4. A non-combustible substance—Do not catch fire.

5. Bursting of crackers and gunshot—Explosive combustion.
6. Wind energy to produce electricity—Wind Mill.

**(C) Answer the following short questions :**

**1. Combustion**

Combustion is a chemical process in which heat and light are produced. In this process, the material combines with oxygen in the air to give out energy in the form of heat and light. This is known as combustion.

**2. Flame**

A flame is a region where combustion of fuels takes place. The colour of the flame depends on the temperature, amount of air supply and the substance burning. LPG burns with a blue flame, a candle burns with a yellow flame.

**3. A flame can be of two types—**

**(i) Luminous flame :** Luminous flame is a flame accompanied by heat and light. Yellow flame is a luminous flame and is observed where there is insufficient oxygen. Its temperature is lower than that of a blue flame and it leaves black soot and other residues.

**(ii) Non-luminous flame :** A non-luminous flame is accompanied by heat but very little light. The blue flame is known luminous and occurs because of complete combustion of hydrocarbons in presence of excess of oxygen. This type of flame does not leave any residue.

4. Substances, which give good amount of heat and burn with less effort, can prove to be good fuels. Some fuels leave behind ash or residue like charcoal and smoke. A good fuel is easily available, burns in air at a moderate rate, does not leave any residue and generates maximum heat per unit mass. This is known as the calorific value of the fuel.

**5. Limitations of fossil fuels**

As we have studied that fossil fuels took thousands of years for formation. Use of fossil fuels is increasing with increase in population. So, these known fuels will last only for a few thousand years. We need to conserve the fossil fuels, keeping the limitation of fossil fuels in mind.

Burning of coal, oil and gas contributes to major environmental problems, releasing CO<sub>2</sub> gas. Accumulation of vast amount of CO<sub>2</sub> is the cause of global warming due to greenhouse effect and acid rain. Global warming is creating many problems on earth. Normal weather pattern is highly disturbed because of global warming and it has resulted in more incidences of natural calamities. Acid rain is harmful for both flora and fauna. Apart from endangering flora and fauna, acid rain also harms Historical monuments.

Accidental spilling of oil on land and sea is poisonous and fire hazard. Oil spills at sea kill aquatic organisms destroying the aquatic organisms. Inhalation of oxides of nitrogen, sulphur, carbon monoxide etc. has been a cause of respiratory diseases and can be a trigger for major illnesses like cancer. Therefore, these fossil fuels should be used only when absolutely necessary

**(D) Answer the following long questions :**

1. **Rapid Combustion** : It is a form of combustion in which a large amount of heat and light is released in a very short span of time. This often occurs as a fire. Burning of LPG, burning of petrol, burning of a matchstick and burning of magnesium ribbon are all examples of rapid combustion.

**Slow combustion** : This type of combustion takes place very slowly and at low temperature. A steady production of heat is evolved in this type of reaction. Rusting of iron and bright shining surface of copper becoming dull are examples of slow combustion. Respiration is also an example of slow combustion.

**Incomplete combustion** : Incomplete combustion of hydrocarbon fuels takes place in inadequate amount of air or oxygen. This results in the formation of carbon monoxide, soot, water, heat and light. The evolution of heat is less during incomplete combustion.

2. **Conditions necessary for combustion**

Following conditions are necessary for burning something—

- (i) A combustible substance
- (ii) Ignition temperature and
- (iii) Oxygen

**Combustible substance** : A combustible substance is a substance that burns in the presence of air or oxygen to produce heat and light. The presence of combustible substance is necessary for combustion to take place.

**Ignition temperature** : A combustible substance requires a definite quantity of heat to start burning. It has to reach a particular temperature to gain that heat. This minimum temperature at which a combustible substance starts burning is known as ignition temperature. Certain substances have very low ignition temperature and can catch fire easily with a spark or a flame; such substances are known as inflammable substances. Paper, plastic, kerosene, LPG have low ignition temperature and so they catch fire easily.

**Oxygen** : The presence of air or oxygen is necessary for combustion to take place. It means that oxygen is a supporter of combustion. In the absence of air or supply of oxygen, a combustible substance will not burn.

3. **Zones of a flame**

When a candle is lit, its flame is in spindle shape and not uniform. It varies in its colour and heat. Accordingly, we divide the flame in 3 zones – Outer zone, Inner zone, and Middle zone.

- (i) **The innermost zone** : The innermost zone or dark zone of the candle appears black as it lacks oxygen. Hence no combustion takes place. It contains unburnt vapours and is the coolest zone of the candle flame. If we place one end of a glass tube in the dark zone and hold a burning matchstick near the other end, the flame of the unburnt fuel coming out at the other end will burn.
- (ii) **The middle zone** : The middle zone or the luminous zone is where the wax vapours start burning. They emit a yellowish flame due to glowing of carbon particles, which are formed along with carbon-monoxide owing to their partial

combustion in insufficient oxygen. The flame is luminous but not very hot. This is the largest and the brightest zone of the flame. This zone gives soot and smoke.

(iii) **The outermost zone :** The colour of the flame is blue and this is the hottest part of the flame. This zone is also called non-luminous zone. In this zone, the wax vapours have enough oxygen to burn completely and produce carbon dioxide and water. The flame appears blue and the temperature is very high. The temperature of this zone is around 1800°C.

4. **Spontaneous combustion :** When a combustible substance burns into flames without applying any external heat, it is known as spontaneous combustion. Substances, such as white phosphorus, catch fire on their own at room temperature.

(E) **Fill in the blanks with the given words below :**

- |             |               |              |
|-------------|---------------|--------------|
| 1. coal     | 2. petrol     | 3. wood      |
| 4. luminous | 5. combustion | 6. education |

(F) **Write true or false :**

- |          |          |         |          |         |
|----------|----------|---------|----------|---------|
| 1. False | 2. False | 3. True | 4. False | 5. True |
|----------|----------|---------|----------|---------|

(G) **Match the following :**

1. Flame—3 zones
2. Combustible substance—wood
3. Burning of firecrackers—explosive combustion
4. LPG—liquid petroleum gas
5. Petrol—liquid fuel

(H) **Activity :**

**Do yourself.**

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## Chapter 7 : Conservation of Animals and Plants

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(A) **Multiple Choice Questions (MCQ) :**

Tick (✓) the correct answer :

- |        |        |        |        |        |        |
|--------|--------|--------|--------|--------|--------|
| 1. (c) | 2. (a) | 3. (a) | 4. (b) | 5. (a) | 6. (c) |
|--------|--------|--------|--------|--------|--------|

(B) **One word question answers :**

1. Cutting down of trees in large number—Deforestation
2. Book containing list of endangered species—The Red Book.
3. Species restricted to a particular geographic region—Endemic species.
4. Species at risk of extinction—Endangered species.
5. Programme aiming to attain the Lost green cover—Van Mahotsav Programme.
6. Project Tiger stands for—Preserving Tiger population.

(C) **Answer the following short questions :**

1. The term biodiversity includes all the forms of life that is plants, animals and microorganisms present on earth and their habitat. The term biodiversity is also referred to as biological diversity. Biodiversity varies with climatic conditions. It is

not uniformly distributed all over the Earth. Biodiversity of a place is characterized by its flora and fauna.

2. Species, that no longer exist anywhere on earth are called extinct species, for example : Dodo, passenger pigeon and Dinosaurs. The population of an organism which is at risk of extinction are known as endangered species. One horn Rhino and tiger are example of endangered species.
3. **Conservation of Biodiversity** : To conserve means to protect. The threatened animals and plants can be kept in captivity in a way to stop them from disappearing forever. But, in the long-term, they need wild places to live and survive. Thus, protecting the wild habitat of animals is vitally important. The conservation of wildlife is directly related to healthy and better forest. Rising population give rise to demand of place, cloth and food. As we need shelter, animals also need shelter. Animals and plants are also a vital part of our life. By protecting the earth's wildlife, we are protecting our own future. It is our duty and responsibility to protect our planet and maintain its beauty. Conservation is not only protection but also maintenance of sustainable yield and quality of plants and animals.
4. **Red Data Book** : The Red Data Book contains list of endangered species. There are separate red data books for animals, and plants. Red Data Book is issued by International Union for Conservation of Nature (IUCN) now known as World Conservation Union (WCN). International Union for conservation of nature is the oldest and largest environmental network, comprising more than 1000 government organizations and NGOs. It has 11000 volunteer scientists in 160 countries. The first Red Data Book on animals was compiled in 1991.
5. The plant life of a particular area is called flora and the animal life of a particular area is called fauna.

**(D) Answer the following long questions :**

**1. Loss of Biodiversity**

Human population has been increasing at a rapid rate. For fulfilling the increasing demand of increasing population we need more and more natural resources. Human population is destroying plants and animal species to fulfill their need of housing, clothing and food. Some of the causes that threaten the existence of plants and animals on the earth are as follows—

1. **Deforestation** : Forests are large reserves of biodiversity providing resources for the survival of a variety of flora and fauna. Large scale destruction of forest, called deforestation, by man for his innumerable requirements leads to the loss of the natural habitat of many plants and animals to a great extent. Deforestation has an adverse effect on biodiversity. Some consequences of deforestation are global warming, drought, soil erosion, desertification (decrease in groundwater level), floods and loss of nutrients.
2. **Climatic change and natural disasters** : Natural and human induced activities cause climatic changes leading to the destruction of plants and animal species.

3. **Overgrazing** : Overgrazing by increasing population of animals also leads to the loss of biodiversity.
4. **Indiscriminate killing of animals** : Large scale hunting of animals for food, medicines, skin, ornaments, fur etc. is one of the biggest threat to biodiversity.

## 2. Conservation of Biodiversity

To conserve means to protect. The threatened animals and plants can be kept in captivity in a way to stop them from disappearing forever. But, in the long-term, they need wild places to live and survive. Thus, protecting the wild habitat of animals is vitally important. The conservation of wildlife is directly related to health and better forest. Rising population give rise to demand of place, cloth and food. As we need shelter, animals also need shelter. Animals and plants are also a vital part of our life. By protecting the earth's wildlife, we are protecting our own future. It is our duty and responsibility to protect our planet and maintain its beauty. Conservation is not only protection but also maintenance of sustainable yield and quality of plants and animals. To protect natural habitat of flora and fauna, certain areas have been designed as protected areas by our government. Interference of human population is prohibited in these areas.

3. **Wildlife sanctuaries and national parks**—Wildlife sanctuaries and national parks are protected forests all across the world to preserve certain plant and animal species. In India there are around 100 national parks and about 500 Wildlife sanctuaries. Here cutting down of trees, grazing of animals, Forestry operations, cultivation of crops and hunting animals is strictly prohibited. Visitors are allowed to enter only for study, cultural and receptive purposes. Here plants and animals are allowed to reproduce and increase in numbers.

## 4. Role of government in conservation

Government is doing great efforts towards conservation. Government has designed some areas as protected areas which are called as wildlife sanctuaries, national parks and Biosphere Reserves.

**Wildlife sanctuaries and national parks**—Wildlife sanctuaries and national parks are protected forests all across the world to preserve certain plant and animal species. In India there are around 100 national parks and about 500 Wildlife sanctuaries. Here cutting down of trees, grazing of animals, Forestry operations, cultivation of crops and hunting animals is strictly prohibited. Visitors are allowed to enter only for study, cultural and receptive purposes. Here plants and animals are allowed to reproduce and increase in numbers.

**Biosphere Reserves**—The Biosphere Reserves are multipurpose protected areas developed to conserve biodiversity, to preserve ecological balance and to promote conservation. Sanctuaries and national parks may also be present inside a biosphere reserve.

**Zoological parks and botanical gardens**—Animals are kept in zoological parks kosmos, where attempts are made to recreate their natural habitat. Botanical gardens are the special gardens, where rare plants are kept. Special care such as soil, temperature and humidity are provided similar to their natural habitat. Humans are allowed to enter zoo and botanical gardens only to see the disappeared plants and



animals and not allowed to do any other activity. Besides these protected areas designed by government, government has designed some projects and programs too to promote wildlife awareness amongst people.

**Project Tiger and project elephant**—Project Tiger, a centrally sponsored scheme, is a project in preserving tiger population. It was launched in April 1973 at Corbett National Park. It involves 28 Tiger Reserves. Project elephant, a centrally launched scheme, was started in February 1992. It involves 25 elephant reserves across the country in 13 states and union territories.

## 5. Migration

Movement of animals in large numbers from one place to another to overcome unfavourable conditions is called migration.

Generally, migrating species go to a distant and different place for a certain period of time and then return back to their endemic land. Some birds fly to far away areas every year during a particular time because of climatic changes. Migration may be seasonal for reasons such as breeding and reproduction. They fly for laying eggs as the weather in their Natural Habitat becomes very cold and inhospitable. Seasonal migration occurs in many species of insects, Birds, Marine mammals and herbivorous mammals. Siberian cranes, during winters, come in large numbers to Bharatpur, Rajasthan and Rann of Kutch, Gujarat. Great flamingos, white wagtail, Eurasian golden oriole are some examples of migratory birds.

### (E) Fill in the blanks with the given words below :

- |            |           |               |
|------------|-----------|---------------|
| 1. flora   | 2. fauna  | 3. biological |
| 4. species | 5. exotic | 6. 500        |

### (F) Write true or false :

- |         |          |          |          |         |
|---------|----------|----------|----------|---------|
| 1. True | 2. False | 3. False | 4. False | 5. True |
|---------|----------|----------|----------|---------|

### (G) Match the following :

1. Reforestation—planting new trees
2. Flora—plants found in a particular area
3. Fauna—animals found in a particular area
4. National parks—areas meant for conservation of biodiversity
5. Migration—moving to another place

### (H) Activity :

Do yourself.

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## Chapter 8 : Cell—Structure and Function

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### (A) Multiple Choice Questions (MCQ) :

Tick (✓) the correct answer :

- |        |        |        |        |        |        |
|--------|--------|--------|--------|--------|--------|
| 1. (c) | 2. (a) | 3. (c) | 4. (b) | 5. (c) | 6. (b) |
|--------|--------|--------|--------|--------|--------|

### (B) One word question answers :

1. Cell was discovered by—Robert Hooke.

2. Single cell organisms—are unicellular organisms.
3. Multiple cell organism—are multicellular organisms.
4. Green colour plastids—chloroplasts.
5. Absence of cell wall—in animal cell.
6. First organisms to exist on earth—prokaryotes.

**(C) Answer the following short questions :**

1. All organisms are made up of tiny structures called cells. The cell is the basic structural unit of our body. Most living organisms are made up of a large number of cells and the cells perform all the life activities of an organism.
2. All cells have similar generalized structure. A cell is like a tiny bag which is filled with very important tiny structures and fluids. These tiny structures are the little organs within the cell known as organelles.
3. All cells have a basic structure, consisting of three main parts—
  - (i) Cell membrane
  - (ii) Cytoplasm
  - (iii) Nucleus
4. **Lysosomes**—Also called as suicidal bags of a cell, this secretes chemicals that can dissolve the cell and kill it at times. These organelles are not visible under a compound microscope. They can be seen only with the help of powerful microscope like the electron microscope.
5. **Prokaryotes and Eukaryotes**

Cells can be divided into prokaryotes and eukaryotes on the basis of their cell structure.

**Prokaryotes**—The organisms in which the cell nucleus is not well defined and there is absence of genetic material. The prokaryotes were the first organisms to exist on earth. Bacteria and blue-green Algae are examples of prokaryotic cells.

**Eukaryotes**—The organisms which have a well organized nucleus and other membrane bound organelles are called eukaryotes, such as all organisms except bacteria and blue-green algae.

**(D) Answer the following long questions :**

**1. Plant and Animal Cells**

The major differences between Plant cell and Animal cell are as follows :

Plant cells have a cell wall whereas animal cells lack cell wall. Animal cells do not have chloroplast whereas plant cells have chloroplasts, containing chlorophyll pigment. Vacuoles are either absent or extremely small in animal cells, but in plant cells vacuoles are very large filled with watery fluid. Centrosomes help in cell division in animal cells but plant cells do not have centrosomes that help in cell division. The stored food material in plant cell is starch and in animal cell is glycogen. In plant cells, nucleus is present at the Periphery of the cell and in animal cells it is present at the centre of the cell.

## 2. Cell-Structure and Function

Though cells in different forms of life show variations in size, shape and form, all cells have similar generalized structure. A cell is like a tiny bag which is filled with very important tiny structures and fluids. These tiny structures are the little organs within the cell known as organelles. All cells have a basic structure, consisting of three main parts—

- (i) Cell membrane
- (ii) Cytoplasm
- (iii) Nucleus

(i) **Cell membrane**—Cell membrane, also called plasma membrane is a very thin, delicate and Elastic covering. The outermost lining of an animal cell is the plasma membrane. It protects and encloses the cell while separating it from other cells. It is called a selectively permeable membrane, which means, it regulates the flow of substances such as allows only certain materials to pass into the cell while restricting the others. A plant cell differs from an animal cell. In the plant, cell is surrounded by another outer layer called cell wall around the cell membrane. Cell wall is that tough and rigid layer that surrounds the cell membrane of plant cell and provides them support and protection. Cell wall is absent in animal cells.

(ii) **Cytoplasm**—The cytoplasm is the fluid which holds all the cell organelles. A jelly like fluid, it also contains salts, proteins, sugar and other nutrients required by the cell. Which cell organelle is responsible for a specific function and the collective work of all the cell organelles is very important for making the cell work as a single unit. Some of the cell organelles are found within the cell are the following—

**Plastids**—They are different coloured organelles found only in plant cells. Chloroplasts are the green coloured plastids containing chlorophyll which is very essential for the process of photosynthesis. Leucoplasts that help in storage of food, are colourless plastids. Chromoplasts are the plastids that impart colour to flowers and skin of fruits.

**Vacuoles**—They are membrane-bound sacs meant for storage, digestion and waste removal. Excess water, useful minerals, pigments, etc. are dissolved in the fluid inside the vacuoles. Plant vacuoles are usually larger in size than animal vacuoles.

**Golgi apparatus**—also called Golgi bodies, they are mainly responsible for secretion of chemical substances such as enzymes, hormones and protein.

**Endoplasmic reticulum**—a network of tubules and channels, involved in synthesis, storage and transport of cellular products.

**Ribosomes**—They are small granular sites of protein synthesis, spread in the cytoplasm.

**Centrosome**—Typical of an animal cell, a centrosome initiates and regulates cell division.

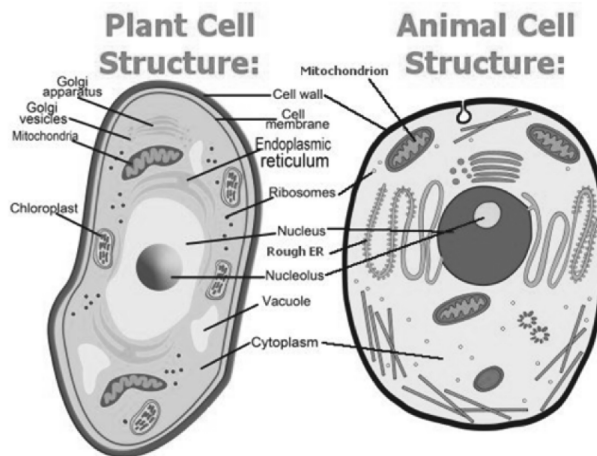
**Mitochondria**—They are tiny, spherical or rod shaped sites of energy production in a cell.

**Lysosomes**—Also called as suicidal bags of a cell, this secretes chemicals that can dissolve the cell and kill it at times. These organelles are not visible under a compound microscope. They can be seen only with the help of powerful microscope like the electron microscope.

(iii) **Nucleus**—The nucleus is present inside the cell, surrounded by the cytoplasm. The nucleus is the boss of the cell. It controls every activity that happens in the cell.

Most cells have one nucleus. Muscle cells have more than one nucleus. The outermost layer of the nucleus is called the nuclear membrane. It separates the nucleus from the cytoplasm. It has tiny holes in it which allow exchange of substances between the nucleoplasm and the cytoplasm. The jelly like fluid inside the nucleus is called the nucleoplasm. Chromosomes and nucleoli are present in the nucleoplasm. Chromosomes are thread like structures will play an important role in the inheritance of characters from one generation to another. The nucleus is the control centre of the cell. It helps in transmission of characters from one generation to another.

3.



4. **Cell-Structure** : Though cells in different forms of life show variations in size, shape and form, all cells have similar generalized structure. A cell is like a tiny bag which is filled with very important tiny structures and fluids. These tiny structures are the little organs within the cell known as organelles. All cells have a basic structure, consisting of three main parts—

- (i) Cell membrane
- (ii) Cytoplasm
- (iii) Nucleus

5. The cytoplasm is the fluid which holds all the cell organelles. A jelly like fluid, it also contains salts, proteins, sugar and other nutrients required by the cell. Which cell organelle is responsible for a specific function and the collective work of all the cell organelles is very important for making the cell work as a single unit. Some of the cell organelles are found within the cell are the following—

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essential for the process of photosynthesis. Leucoplasts that help in storage of food, are colourless plastids. Chromoplasts are the plastids that impart colour to flowers and skin of fruits.

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**Mitochondria**—They are tiny, spherical or rod shaped sites of energy production in a cell.

**Lysosomes**—Also called as suicidal bags of a cell, this secretes chemicals that can dissolve the cell and kill it at times. These organelles are not visible under a compound microscope. They can be seen only with the help of powerful microscope like the electron microscope.

(E) **Fill in the blanks with the given words below :**

- |             |                |                     |
|-------------|----------------|---------------------|
| 1. suicidal | 2. glycogen    | 3. Amoeba           |
| 4. cell     | 5. centrosomes | 6. blue-green algae |

(F) **Write true or false :**

- |         |          |         |         |          |
|---------|----------|---------|---------|----------|
| 1. True | 2. False | 3. True | 4. True | 5. False |
|---------|----------|---------|---------|----------|

(G) **Match the following :**

1. RBC—spherical
2. Amoeba—irregular shape
3. Muscle cell—spindle
4. Nerve cell—branched
5. Smallest cell—bacterium

(H) **Activity :**

Do yourself.

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## Chapter 9 : Reproduction in Animals

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(A) **Multiple Choice Questions (MCQ) :**

Tick (✓) the correct answer :

- |        |        |        |        |        |        |
|--------|--------|--------|--------|--------|--------|
| 1. (b) | 2. (c) | 3. (c) | 4. (c) | 5. (c) | 6. (a) |
|--------|--------|--------|--------|--------|--------|

(B) **One word question answers :**

1. Reproduction without fusion of gametes—asexual reproduction.

2. Reproduction with fusion of two gametes—sexual reproduction.
3. Male gamete—are sperms.
4. Female gamete—are ova
5. Plants reproduce through—flowers
6. Binary fission takes place in—unicellular organisms

**(C) Answer the following short questions :**

1. The process by which living beings produce offspring of their own kind is called reproduction. Reproduction is essential for the continuation of species, to ensure the similar kinds of individuals, generation after generation.
2. The process of joining or fusion of a male and female gamete to form zygote is called fertilization. When fertilization takes place inside the female's body, it is known as internal fertilization. The male discharges the male gametes inside the body of the female and fertilization occurs inside the female body.
3. A pair of testes is the main part of the male reproductive system. Testes hang in a pouch like structure, outside the body. The pouch is known as scrotum.
4. Metamorphosis in insects shows four such life stages starting from egg to the larva, pupa and, finally, the adult. The larva is known as maggot in flies, a caterpillar in butterflies and a tadpole in frogs.
5. The sperms are put inside the female body, when they fertilize egg. This is known as internal fertilization. The fusion of the gametes take place outside the female's body it is called external fertilization.

**(D) Answer the following long questions :**

**1. Reproductive System**

The reproductive system of males and females are different from each other, performing different functions.

**Male reproductive system**—A pair of testes is the main part of the male reproductive system. Testes hang in a pouch like structure, outside the body. The pouch is known as scrotum. The fact, that testes hang outside the body, provides a lower temperature to testes. This is necessary for optimum production of sperms. Testes produce the male gametes which are known as sperms. Sperms are transferred to seminal vesicle where they are stored. A tube connects the seminal vesicle with the opening in the penis. The sperm is made of single cell. It has a head and a tail. The tail helps the sperm in swimming, which helps it to reach female gamete.

**Female reproductive system**—A pair of ovaries lies at the back of the abdomen just below the kidney, from which female gametes, called ova and hormones are produced. An ovum is round in shape. Usually one ovum is released from one of the ovaries every month. Ovum released from the ovary travels down to uterus through oviducts or fallopian tubes to meet sperm for fertilization.

Oviduct or fallopian tubes are funnel shaped openings. The oviduct is attached to a tubular canal known as uterus or womb. Uterus is pear shaped, where development of fertilized egg or zygote occurs into a baby. Uterus leads to vagina. Vagina is a wide muscular tube, which opens to the outside of the body.

## 2. Fertilization and development of the zygote

In humans, fertilization takes place in the oviduct, and if an ovum is met with, fertilization can take place. When a sperm head penetrates the ovum, fusion takes place. The zygote divides and forms a ball of cells, which travels to the uterus and gets implanted in the uterine wall and begins to grow. At this stage it is called an embryo. The uterus is well prepared to receive the embryo by building up a thick cushion like lining rich in blood vessels. As the embryo continues to grow, its cells differentiate into muscle cells, blood cells, nerve cells, etc. Various tissues and organs are formed from these cells. The growing embryo now is called the foetus. The foetus receives food and oxygen from the mother's blood and releases the waste into it through a tube shaped organ called the placenta.

Once the development is complete, which normally occurs in about 38 weeks, the baby is ready to be born. This is the journey of zygote into a full fledged human being.

3. (i) **Sexual reproduction in animals**—The process whereby new individuals are formed by union of specialised female gametes (ova) and male gametes (sperms) is known as sexual reproduction. Majority of animals reproduce through sexual reproduction.

Sexually reproducing animals either lay eggs or give birth to young ones. Animals giving birth to young ones are called viviparous animals whereas animals laying eggs are called oviparous animals.

- (ii) **Asexual reproduction in animals**—In asexual reproduction, formation of gametes or reproductive cells do not take place. It involves only one parent and the offspring is identical to the parent. Since no fusion of gametes is involved, no zygotes are formed in asexual reproduction. Animals like Amoeba, Paramecium and Hydra reproduce through asexual mode of reproduction. There are several methods of asexual reproduction in animals like binary fission, budding, fragmentation and regeneration.

## 4. Metamorphosis

Some animals show different stages of development between hatching of the eggs and the formation of the newborn. This is observed in case of life cycle of frog, which is capable of jumping and swimming.

The process of transformation of the individual, which are born or hatched from an egg into another through drastic changes is called metamorphosis. Metamorphosis in insects shows four such life stages starting from egg to the larva, pupa and, finally, the adult. The larva is known as maggot in flies, a caterpillar in butterflies and a tadpole in frogs.

5. (i) **Reproduction in reptiles and birds** : Reptiles and birds lay eggs. The male and female mate on the land. The sperms are put inside the female body, when they fertilized egg. This is known as internal fertilization. The fertilized eggs are coated with a protective shell. The embryo is provided with a store of food inside the shell. After the hard shell is formed around the developing embryo, the hen Lays the egg. After laying egg, the bird incubates it. In about 3 weeks, embryo develops into a chick. At the end of the incubation period, when the development of the embryo is completed, the chick hatches by bursting open the eggshell.



(ii) **Reproduction in fish** : When fertilization, the fusion of the gametes take place outside the female's body it is called external fertilization. In many water animals, such as fish, crab and frogs, fertilization occurs outside the body of the organism. In this type of fertilization female lays her eggs in the water and the male releases sperms closely. The sperms flow to the eggs and fertilizers them. The eggs and sperms fuse in the water.

(E) **Fill in the blanks with the given words below :**

- |           |           |             |
|-----------|-----------|-------------|
| 1. zygote | 2. birth  | 3. internal |
| 4. round  | 5. vagina | 6. embryo   |

(F) **Write true or false :**

1. True      2. True      3. False      4. True      5. True

(G) **Match the following :**

1. Giving birth—reproduction
2. Metamorphosis—frog
3. Asexual reproduction—no fusion
4. Testes—scrotum
5. External fertilization—fish

(H) **Activity :**

**Do yourself.**

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## Chapter 10 : Adolescence Age

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(A) **Multiple Choice Questions (MCQ) :**

Tick (✓) the correct answer :

1. (c)      2. (c)      3. (a)      4. (b)      5. (a)      6. (b)

(B) **One word question answers :**

1. Female sex hormone—estrogen.
2. Male sex hormone—testosterone.
3. Chowmein, pizza, bergers etc.—junk foods.
4. Full form of AIDS—Acquired Immuno Deficiency Syndrome.
5. XX pair of chromosomes—in female
6. Disease caused due to lack of Iodine—a bulge developed around the neck.

(C) **Answer the following short questions :**

1. The phase of life during which we develop to become an adult is probably the phase of many interesting and important developments in human life. The period of life, leading to reproductive maturity, is called adolescence. This is also known as puberty or teenage and it fills the gap between childhood and adulthood.
2. **Hormones** : At puberty, the physical, mental, intellectual and emotional changes are regulated by hormones. Hormones are the chemical substances that are secreted from endocrine glands or ductless glands. There are various endocrine glands in our body. Estrogen is the female sex hormone. Testosterone is the male sex hormone.

3. In every human female, at birth, the ovaries contain many immature eggs. After the onset of puberty, one egg matures every 28 days and is released into the oviduct. This process is called ovulation.
4. A gland is an organ that produces chemicals necessary for the normal functioning of the body. There are various endocrine glands in our body.
5. **Drug Abuse** : Drug abuse is increasingly becoming common during adolescence. Drugs are chemical substances that produce physical, mental, behavioural or emotional changes in the user. Use of drugs for purposes other than medicinal use is called drug abuse. This is very harmful for the body. It causes a complete dependence on them. Alcohol, nicotine, cocaine and marijuana are examples of drugs.

**(D) Answer the following long questions :**

**1. Sex determination**

The nucleus of cells contains chromosomes. Normal cells are called somatic cells and cells which fuse to make fertilized egg are called gametic cells. There are 23 pairs of chromosome in somatic cells in humans. Chromosomes are similar in 22 pairs. The 23rd pair has similar type of chromosome in females and dissimilar type of chromosomes in males. Due to this, the female sex is called homogametic sex, while the male sex is called heterogametic sex. The pair of chromosomes is written as XX in females and as XY in males. The 23rd pair of chromosomes is also called sex chromosome. The number of chromosomes in gametes is half of number of chromosomes in somatic cells. Hence there are 23 chromosomes in human gametes. An unfertilized egg has one X chromosome, as the 23rd chromosome. A sperm can have either X or Y chromosome, as the 23rd chromosome. When a sperm, with X chromosome fertilizes the egg, the zygote gets two X chromosomes in the last pair. Such a zygote develops into a female child. If a sperm, with Y chromosome fertilizes the egg, the zygote gets 1 X and Y chromosome in the last pair. Such a zygote develops into a male child.

2. The boys and girls both exhibit certain secondary sexual characters. The characteristics, that help to distinguish voice from girls during adolescence former are known as secondary sexual characters. The secondary sexual characters in humans are as follows—

Boys develop facial hairs and hairs on chest. Breasts get enlarged in girls. Hair develops under armpit and in pubic region, in both boys and girls. Shoulders and chest of boys broaden and on the other hand broadening of hips and widening of pelvic region is noticed in girls. Due to the growth of voice box or larynx in boys, their voice becomes deep and heavy. In girls, their voice becomes high pitched. In girls menstrual cycle or monthly period starts.

**3. Ductless glands or Endocrine glands**

Apart from some of the endocrine glands like pituitary, the testes and the ovaries, there are other endocrine glands in our body such as thyroid, pancreas and adrenals.

- (i) **Thyroid gland**—Thyroid gland is situated in the neck. The hormone, thyroxine is produced by the thyroid gland. Thyroxine is mainly composed of Iodine. Thyroxine is responsible for maintaining proper rate of metabolism in the body.

- (ii) **Pancreas**—located near the liver, it secretes insulin. Insulin helps to maintain the blood sugar level. If the pancreas are not producing insulin in sufficient quantities, there is decreased utilization of glucose.
  - (ii) **Adrenal glands**—The adrenal glands are endocrine glands that produce a variety of hormones including adrenaline and the steroids aldosterone and cortisol. Adrenaline helps the body to adjust the stress when one is angry, embarrassed or worried.
4. This adolescence phase starts after crossing infancy and childhood. The adolescence phase begins around 11 years of age and finishes around 18 or 19 years of age. The human body undergoes several changes during adolescence and these changes coincide with onset of the process of reproductive maturity. With the completion of reproductive maturity, the puberty phase ends.

Boys and girls of this age are known as adolescent boys and girls. They go through rapid physical, mental and emotional changes. All these are brought about by the hormones produced by their reproductive organs—Ovaries in girls produce the female hormone estrogen which promotes the production of egg cells. The testes in boys produce the male hormone testosterone, which stimulates the production of sperms.

**(E) Fill in the blanks with the given words below :**

- |                |              |                |
|----------------|--------------|----------------|
| 1. chromosomes | 2. Iodine    | 3. estrogen    |
| 4. deep        | 5. menstrual | 6. adolescence |

**(F) Write true or false :**

- |         |         |          |          |         |
|---------|---------|----------|----------|---------|
| 1. True | 2. True | 3. False | 4. False | 5. True |
|---------|---------|----------|----------|---------|

**(G) Match the following :**

1. Drug—nicotine
2. Insulin—maintains blood sugar
3. Adrenal gland—adrenaline
4. Adam's Apple—present in boys only
5. Oil glands—sebum

**(H) Activity :**

**Do yourself.**

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## Chapter 11 : Force and Pressure

**(A) Multiple Choice Questions (MCQ) :**

Tick (✓) the correct answer :

- |        |        |        |        |        |        |
|--------|--------|--------|--------|--------|--------|
| 1. (c) | 2. (a) | 3. (c) | 4. (a) | 5. (b) | 6. (c) |
|--------|--------|--------|--------|--------|--------|

**(B) One word question answers :**

1. What helps camel to walk easily on sand— it has wide feet
2. Name any one contact force—Muscular Force
3. Formula to calculate force on a body is— $F = m \times a$
4. Name of Instrument used to measure pressure—pressure gauges or vacuum gauges

5. Gravity is a type of—Force of Attraction
6. Example of Muscular force—Force that comes from action of muscles

**(C) Answer the following short questions :**

1. **Acceleration**—Acceleration is a measure of how fast velocity changes. Acceleration is the change of velocity divided by the change of time. Acceleration is a vector, and therefore, includes both a size and a direction.

2. **Magnitude of force**

We have learnt in the previous example of tug of war that the team which applies much force in comparison to other team wins therefore we can say that, the strength of the force is usually expressed by its magnitude and magnitude is the thing which tells us how much force is being applied in a time duration.

3. **Frictional force :** Frictional force is a force, acting along the two surfaces in contact and tend to oppose the motion. Frictional force is more between two rough surfaces and less between two smooth surfaces. For example, sole of shoes often gets worn-out due to frictional force that acts between them and the ground as we walk.

4. The human body generally does not experience this high atmospheric pressure, as it is counter balanced by the pressure of the blood running in the blood vessels. The height of place above the sea level is known as its altitude. The atmospheric pressure reduces on high altitudes. This is the reason when someone has high blood pressure and go to high altitudes it, starts bleeding from nose due to rupture of blood vessels.

5. **Contact Forces**

Those forces which represent the result of physical contact between two objects, where one of the objects exerts force on the other are known as Contact forces.

**(D) Answer the following long questions :**

1. Force is a vector quantity which means it has both magnitude and direction.

If we need a simple definition we can say that when a push or pull is applied to an object it is called force, a force can change the state of an object from rest to motion. Force makes an impact or brings a change when makes an interaction with another body. We can see many things happening around us like a man tries to push a car by his hands and the car comes in motion or a man is trying to pull an ox by pulling the rope tied around its neck by his hands. We can now understand that at least two objects must interact for a force to come into play. Thus, an interaction of one object with another object results in a force between the two objects.

Forces applied on an object in the same direction add to one another. If the two forces act in the opposite directions on an object, the net force will be the difference between the two forces.

$$F = m \times a$$

where

$$F = \text{Force}$$

$$m = \text{mass of object}$$

$$a = \text{acceleration}$$

The SI unit of force is newton (N). Dyne is also used as a unit to calculate force.

## 2. The types of contact forces are :

- (a) **Muscular force :** The force that comes into play because of the action of muscles is called muscular force. For example : human beings use muscular force in order to walk, jump, pull something, even to speak anything. Lungs work because of contraction and relaxation of diaphragm which is done with the force, muscles applied onto. Not only humans but animals also use their muscular force to move and do the necessary things for their survival.
- (b) **Frictional force :** Frictional force is the force which comes from the interactions with a surface as an object moves or tries to move relative to the surface. To define frictional force we can say that a frictional force is a force, acting along the two surfaces in contact and tend to oppose the motion. Frictional force is more between two rough surfaces and less between two smooth surfaces. Air also creates frictional force which is also called air resistance.
- (c) **Mechanical Force :** We use number of machines to make the human efforts less and still obtain the same result as before using such machines. So to define it we can say that the force which is generated with machines is called Mechanical force. Machines do not produce the energy themselves, machines use different fuels (petrol, coal, electricity etc.) to operate.

## 3. Atmospheric Pressure

Earth is surrounded by a layer of air known as the atmosphere which extends up to 500 km above the earth surface. Air has weight as it comprises various gases and water vapour and other things which exert pressure on various objects on the earth. The air present in the atmosphere exerts a pressure on the earth which is called atmospheric pressure. The value of atmospheric pressure at the sea level is 101325 pascals (which can also be written as 100 kPa) which is called normal pressure or standard pressure. The atmospheric pressure keeps on increasing as we move towards the Earth's surface.

## 4. Non-contact Forces

- (a) **Magnetic Force :** We know that a magnet can attract a piece of iron. Hence, we can say that the magnet pulls the iron piece towards itself due to its magnetic force. A magnet can exert its force on an object even from a distance and does not need to touch that object. Even opposite poles of magnet attract other pole of the magnet and same poles of both the magnet repel each other. If two forces are acting upon each other having equal magnitudes (strength) and in opposite directions then the net force acting on the object will be zero. Therefore we can conclude that magnets also exert a push or pull force.
- (b) **Electrostatic Force :** Electrostatic force is meant by a force that is applied by a charged body on another charged or non-charged body. The force exerted by a charged particle is called electrostatic force. It is also known that like charges always repel or push each other away. You may have observed when you go near to a TV screen when the TV is switched on, your hairs straighten up. This happens because of electrostatic force.
- (c) **Gravitational Force :** Objects or things fall towards the earth because it pulls them. This force is called the force of gravity, or just gravity. The force of gravity acts on all objects. The force of gravity acts on all of us all the time without our

being aware of it. Gravity is not a property of the earth alone. In fact, every object in the universe, whether small or large, exerts a force on every other object. It is an attractive force that is applied by the earth on all the objects. Gravity is a property exhibited by every object present in the universe and not only the earth. Hence, all the planets, the moons and even the sun have a gravitational force of their own.

#### 5. A force can change the state of motion

When an object is at rest, its speed is zero. Only moving things are not the example of state of motion, the thing which is in rest state is also called as a state of motion, both standing and moving states are called the states of motion. Any object cannot move by itself or change its state of motion on its own without the application of a force. When a car engine applies force on the rim shaft the wheels start to rotate and when brake shoes apply force on the metallic disc of brakes, the rotating wheels, joined with discs, first slow down and then stop. Therefore we can say that a change in either the speed of an object, or its direction of motion, or both, is described as a change in its state of motion. Thus, a force may bring a change in the state of motion of an object.

#### Effect of Force on Shape

The shape of an object can be altered if some force is applied on it. Depending upon the magnitude of the force that is being applied and the rigidity of the object, the effect on its shape and size can be observed. We all must have played with clay soil in our life, it was fun because with clay we are able to shape it into anything because it is soft and can be easily moulded in any form. Any solid can be reshaped if it is not crystalline in nature by applying force to it. Force is not of only one type, it is of many types like : Applied force, Normal force, Frictional force, Tension force, Air resistance force, Spring force, Gravitational force, Electromagnetic force, Nuclear force etc.

#### (E) Fill in the blanks with suitable (given) words :

- |               |               |             |
|---------------|---------------|-------------|
| 1. moving     | 2. frictional | 3. gases    |
| 4. toothpaste | 5. squeezing  | 6. altitude |

#### (F) Write true or false :

- |         |          |         |         |         |
|---------|----------|---------|---------|---------|
| 1. True | 2. False | 3. True | 4. True | 5. True |
|---------|----------|---------|---------|---------|

#### (G) Match the following :

1. Pull—Force that brings an object closer
2. Dyne, newton—Units to measure force
3. Barometer—Measures atmospheric pressure
4. Gravity—Force that causes things to fall towards the earth
5. Pascal—Unit to measure pressure

#### (H) Activity :

Do yourself.

### (A) Multiple Choice Questions (MCQ) :

Tick (✓) the correct answer :

1. (c)      2. (b)      3. (c)      4. (c)      5. (a)      6. (a)

### (B) One word question answers :

1. Which is known as air resistance—Air creates frictional force.
2. Rubber grips are put on which handles—Bicycle.
3. Graphite powder is used in lowering—friction.
4. Which friction is used in wheels—rolling friction.
5. Write one example of sliding friction—pushing a moving box.
6. Example of static friction—pushing a box

### (C) Answer the following short questions :

1. Frictional force is the force which comes from the interactions with a surface as an object moves or tries to move relative to the surface. Frictional force is more between two rough surfaces and less between two smooth surfaces.
2. **Sliding friction** : The minimum force that is required to keep a moving object in motion at a constant speed is called sliding friction. Sliding friction is always less than static friction.
3. A substance that is introduced between two surfaces in contact, to reduce friction, is called a lubricant.
4. **Disadvantages of Friction**
  - (a) It results in wear and tear of shoes and tyres, machine parts, clothes, etc. due to which we have to buy things over and over and it causes a money loss.
  - (b) It also results in the production of heat. In the case of machines, the production of heat leads to wastage of energy.

### 5. **Methods of Reducing Friction**

Sometimes in order to have a smooth movement of an object we need to reduce friction such as :

Grease is used in vehicle's moving parts to reduce friction and to increase their efficiency. Oil is applied on the hinges of the door so that they can move easily as they block the irregularities of a surface.

Graphite powder is used in some machines to reduce friction. Friction can be minimized by using lubricants in machines to reduce friction between moving parts, Fluid friction can be minimized by giving suitable shapes to the objects moving in the fluids.

### (D) Answer the following long questions :

1. It is difficult and even risky to drive on wet road. The rainwater makes a thin layer on the road and reduces the friction, because of the reduced friction, the wheels of the vehicle can slip and accident can happen. To avoid all these discomforts and



mishappenings friction acts as a necessary evil. Friction is advantageous to us, it is considered as a friend but due to its disadvantages it is a foe.

## 2. Types of friction

1. **Static friction** : The minimum amount of force that is required to overcome the force of friction is called static friction.
2. **Sliding friction** : The minimum force that is required to keep a moving object in motion at a constant speed is called sliding friction. Sliding friction is always less than static friction.
3. **Rolling friction** : When an object rolls over a surface, the friction created is called rolling friction. Rolling friction is less than sliding friction.
4. **Fluid friction/ Viscous friction** : Air, water and other liquids collectively are called fluids. They also exert a frictional force on the object that travels through them. Such a friction is called fluid friction or drag.
5. **Air friction** : When an object moves in the air exerts air friction upon the object it creates the resistance for the object moving into it.

## 3. Methods of Increasing Friction

In real life, there are circumstances when we have to increase the friction. Friction can be increased by increasing the roughness of the surfaces in contact. For example : Rubber grips are put on bicycle handles, electrical tools and on many other tools. Increased friction helps in giving better grip on these objects. Sanding of paper with the help of sand paper increases the friction too, or can sometimes by just bringing small changes to the way of doing things can increase friction as when our hands are slippery or the bottle cap is wet we can help ourselves by holding a bottle cap with a thick towel helps in increasing friction.

4. **Non-contact Force**—A non-contact force is a force which acts on an object without coming physically in contact with it. The most familiar example of a non-contact force is gravity, which confers weight. In contrast a contact force is a force applied to a body by another body that is in contact with it.
5. **Friction- A necessary evil**

It is often said that friction is a necessary evil in life we cannot do many of our routine tasks in the absence of friction. What happens when you try to open a bottle cap with oily hands, you are unable to open the bottle cap? For this you may need the help of someone else who may use a thick towel to make a better grip on the bottle cap. Do you know that it is difficult and even risky to drive on wet road? The rainwater makes a thin layer on the road and reduces the friction, because of the reduced friction, the wheels of the vehicle can slip and accident can happen. To avoid all these discomforts and mishappenings friction acts as a necessary evil. Friction is advantageous to us, it is considered as a friend but due to its disadvantages it is a foe. Thus it is a necessary evil.

### (E) Fill in the blanks with the given words below :

- |             |           |             |
|-------------|-----------|-------------|
| 1. static   | 2. moving | 3. friction |
| 4. graphite | 5. fluids | 6. ball     |

**(F) Say whether the following statements are True or False :**

1. True            2. True            3. True            4. True            5. False

**(G) Match the following :**

1. Graphite Powder—Reduce friction
2. Rubber grips—Bicycle handles
3. Drag—Used in Fluid Friction
4. Rolling friction—Wheels
5. Ball bearings—Fans

**(H) Activity :**

**Do yourself.**

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## Chapter 13 : Sound

**(A) Multiple Choice Questions (MCQ) :**

Tick (✓) the correct answer :

1. (b)            2. (c)            3. (a)            4. (c)            5. (b)            6. (c)

**(B) One word question answers :**

1. The types of sound elephants and whales can listen—**infrasonic waves.**
2. The sound cannot travel in—**vacuum.**
3. Write five senses of human body—**skin, eyes, nose, ears, tongue.**
4. Unpleasant sound to ears is called—**noise**
5. The vocal cords in males are of length—**20 mm**
6. Waves used to treat myopia in kids—**Infrasound**

**(C) Answer the following short Questions :**

1. **Audible and Inaudible sounds :** Audible sounds are sounds of frequency which are audible to human ear. On the other hand, inaudible sounds are those sounds which are over or under the range of human hearing capacity, these are the sounds which humans are unable to hear without using any special equipment. Sounds below 20 Hz and above 20,000 Hz or 20 kilo-hertz are beyond the hearing capacity of humans.
2. Humans make vibration from throat and these are produced when air is blown over vocal cord. We have voice box in our throat which is also named as Larynx, it is a hard bump that seems to move when you swallow food, it is specially designed to produce the voice.
3. Sounds which are pleasant to ears are called Music, regular vibrations produce pleasant and musical sounds. The frequency of notes used to produce music is:

**Indian :** (Sa, Re, Ga, Ma, Pa, Dha, Nee)

**Western :** (Do, Re, Mee, Pha, So, La, Ti)

Sounds which are unpleasant to ears are called Noise. There are so many noises we can point out in our surrounding like noises on traffic signal like honking of vehicles, sounds of operating of huge machineries in factories etc.

4. Everything creates a wave upon moving; and such waves caught and communicated with brain by ear are called sound.

Sound is actually a form of energy that connects us with the world around us. Sound enables individuals to interact with each other.

5. **Noise Pollution**

The presence of excessive or unwanted sound in the atmosphere is called noise pollution. Major causes of noise pollution are sounds of vehicles, explosions including the bursting of crackers, machines, loudspeakers etc.

**(D) Answer the following long questions :**

1. Ear consists of three major parts which are : Outer ear, Middle ear, Inner ear.

**The outer ear :** Outer ear is also known as Pinna. The function of pinna is, it catches the sound waves and forwards them to the next part of the ear, that is, the middle ear.

**The middle ear :** The middle ear consists of eardrum which converts the sound waves into vibrations that then travel to the inner ear. The eardrum is a thin rubber-like sheet present in the Middle ear. Eardrum sends the vibrations to inner ear as soon as the sound waves collected by pinna reaches it.

**The inner ear :** Inner ear is sometimes also known as cochlea. It receives the vibrations sent by the eardrum. It contains a liquid substance and the vibrations that enter the inner ear moves through this liquid. There are tiny hairs present inside the inner ear that turn these vibrations into signals for the brain and pass them to the brain through the hearing nerve. As the brain receives the signal it interprets the sound.

2. **Propagation of sound**

The vibration produced by a body disturbs a medium in which it is produced and the disturbance travels through the medium in the form of wave. Sound always requires a medium to travel from the source of its production to the receiver end.

Sound cannot travel through a vacuum as it lacks any medium of transmission. Sound can travel through solid, liquid. Propagation of sound happens in all directions in a medium. It is interesting to know that the sound travels at different speeds in different kinds of mediums. The speed of sound is influenced by many factors viz. temperature, nature of materials and physical state of matter. Sound needs some vibration of molecules to travel.

Solids have tightly packed particles in them and hence they allow fast propagation of sound through them. Liquids have slightly loosely packed particles and hence it takes a little time for sound to travel in water or through a liquid. Gases have completely loosely packed particles and hence sound takes the most time in travelling through the air. It is interesting to know that the propagation of sound takes place in following sequence :

$$\text{Air} < \text{Liquid} < \text{Solid}$$

Propagation of sound is around 13 times faster in solids than in air and propagation in water is around 4 times faster than in air.

Speed of sound in various substances : (Approximately)

<b>Substance</b>	<b>Speeds in metre/second</b>
Air	346
Water	1,498
Glass	4,540
Iron	5,960
Aluminium	6,320
Diamond	12,000

### 3. Characteristics of sound

Sound is produced by vibrations. How frequent or how strong the vibrations are, is determined by quantities such as frequency and amplitude. The vibration is a back and forth motion of a thing or object.

This motion is also called as oscillatory motion or oscillations. Frequency, time period, and amplitude are the main characteristics of the sound that are associated with sound.

#### Frequency

The number of oscillations or vibrations per second is called the frequency of oscillation. Frequency is denoted by 'f'. For human ears, the range of audible frequencies is roughly from 20 to 20,000 hertz. When we have to measure or calculate the frequency of the sound we have to measure it in terms of hertz. Therefore the standard unit or the SI unit of frequency is hertz (can be shown from Hz).

1 hertz = 1 oscillation per second, 20 hertz = 20 oscillations per second.

**Amplitude** : The maximum distance to which vibrating body moves on either side of its mean position is called the amplitude of vibration.

The amplitude of a sound wave can be defined as the maximum displacement of the particles from their mean position due to the vibrations.

**Time period** : The time taken by a vibrating body to complete one oscillation or vibration is called its time period. It is denoted by 'T'. The S.I unit of time period is seconds (s).

### 4. Types of sound

Sounds are sometimes differentiated on the bases of the loudness of sound; on the bases of the loudness sound can be differentiated as Audible sound and Inaudible sound.

**Audible and Inaudible sounds** : Audible sounds are sounds of frequency which are audible to human ear. On the other hand, inaudible sounds are those sounds which are over or under the range of human hearing capacity, these are the sounds which humans are unable to hear without using any special equipment. Sounds below 20 Hz and above 20,000 Hz or 20 kilo-hertz are beyond the hearing capacity of humans.

**Ultrasonic waves** : The sound of a frequency of above 20000 hertz which human cannot hear are called ultrasonic vibrations or ultrasonic sounds. Ultrasounds can be used for various purposes such as identifying abnormalities in the human body or calculating distances under the water through SONAR. Ultrasonic sounds are generally produced by dolphins, bats and tortoise.

**Infrasonic waves :** The sound of a frequency of vibrations of below 20 hertz which human cannot hear are called infrasonic vibrations or infrasonic sounds these are generally produced by whales, elephants, rhinoceros and giraffe. Infrasound waves also sometimes are used to treat myopia in kids.

**5. Controlling noise pollution**

There are many ways by which noise pollution can be controlled, some are easy and some are very tricky to follow. These are :

1. Factories should be relocated far from residential areas. A big example is that many factories had been shifted to outskirts from Delhi.
2. Trees should be planted along the roads because trees absorb noise.
3. Use of traffic controls to reduce braking and acceleration and improvements in tyre design so that tyres produce less noise while driving.
4. Do not play TVs and music systems at high volumes.

**(E) Fill in the blanks with the given words below :**

- |              |           |           |
|--------------|-----------|-----------|
| 1. looseness | 2. vacuum | 3. motion |
| 4. middle    | 5. noise  | 6. volume |

**(F) Write true or false :**

- |         |          |         |         |          |
|---------|----------|---------|---------|----------|
| 1. True | 2. False | 3. True | 4. True | 5. False |
|---------|----------|---------|---------|----------|

**(G) Match the following :**

1. Space craft launch—140 to 170
2. Jet airplane—140 or above
3. Heavy motor vehicle—90 to 120
4. Light vehicle—60 to 80
5. Traffic signal—60 to 95
6. Normal talking—50 to 60

**(H) Activity :**

**Do yourself.**

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**Chapter 14 : Chemical Effects of Electrical Energy**

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**(A) Multiple Choice Questions (MCQ) :**

Tick (✓) the correct answer :

- |        |        |        |        |        |        |
|--------|--------|--------|--------|--------|--------|
| 1. (a) | 2. (a) | 3. (b) | 4. (a) | 5. (a) | 6. (b) |
|--------|--------|--------|--------|--------|--------|

**(B) One word question answers :**

1. A liquid that has ions in it—water ionized.
2. The solutions, while passing current through them break into its ions—Electrolytes
3. These do not allow current to pass through them—Insulators
4. Application of a protective zinc coating to iron to prevent rusting—is galvanization.
5. The negative terminal of the electric cell is marked—Minus (–)
6. Electrolysis is used in the refining of—copper.

**(C) Answer the following short questions :**

1. The impurities in water (impurities are substances like salts, dissolved in water) make it a conductor.
2. Uses of Electroplating
  - (a) Electroplating is widely used in the Industries such as-automobiles, aeroplanes, electronics etc.
  - (b) To protect metals from corrosion or rusting (using zinc to prevent corrosion on iron: This is known as Galvanization.
3. The 2 names of good conductor are – 1. Copper 2. Gold  
The 2 names of bad conductor are – 1. Wood 2. Rubber
4. The using of zinc to prevent corrosion on iron. This is known as Galvanization.
5. **Electroplating**

Electroplating is a process in which layer of metal is deposited on another material with the help of electricity. Different metals used for electroplating are Nickel, Copper, Gold, Silver, Tin, Brass, Zinc, Chromium and Platinum.

**(D) Answer the following long questions :**

1. **Electrolysis and Electrolytic cells :** The effect in which components of a compound get split due to passing of an electric current through it is called electrolysis. This process is due to the chemical effect of the current.

**Electrolysis in purification of metals :** The method of electrolysis is also used to purify a metal by separating it from the impurities. The impure metal is used as an anode which first dissolves in the electrolyte solution and then deposits on the cathode in the pure form. The impurities of the metal remain in the electrolyte solution only. Metals like copper extracted from its ore by heating the ore with carbon (known as smelting) are purified by this method. Let us take copper as an example and try to understand the process involved in the purification of copper.

We placed anode (Impure copper) and cathode (Pure Copper) into an electrolyte named copper sulphate ( $\text{CuSO}_4$ ), then current is passed through the electrolyte. Copper atoms are oxidised to copper ions then copper ions are transported from anode to cathode. Impurities get settled to the bottom of tank. Metals like aluminium, zinc and copper are purified in this way.

**Use of Electrolysis**

- (a) Electrolysis is used to separate out the impurities of the metal.
  - (b) Electrolysis is used in manufacturing of hydrogen, chlorine, sodium hydroxide and bleaching solution commercially
  - (c) Electrolysis is used in the refining of copper.
  - (d) Electrolysis is used for electroplating.
  - (e) Electrolysis is used for Aluminium anodisation.
  - (f) Electrolysis is used to extract reactive materials.
2. **There are two types of cells : (i) Dry cell (ii) Wet cell : Dry Cell**

The electric cell which we use in our day to day electronics is known as dry cell because it does not contain any liquid chemical.

### **Features of dry cell :**

- (a) The electric cell is a cylindrical device having a small metal cap on one side and a metal disc on the other side.
- (b) **The electric cell has two terminals :**
  - (i) A positive terminal
    - l The metal cap is positive terminal of the electric cell
    - l The positive terminal of electric cell is marked plus (+)
  - (ii) Negative terminal.
    - l Metal disc is the negative terminal of the electric cell.
    - l The negative terminal of the electric cell is marked minus (-)
- (c) The electric cell produces electricity from the chemicals stored inside it.
- (d) These cells are used as a source of electricity in torch, wristwatches, alarm clocks, transistor, radios, TV remotes, toys and many other devices.

### **Wet cell**

A wet cell is called as wet because of the liquid electrolyte present in it. There are two containers in the wet cell and one container is connected to the second container with the help of a salt bridge. Early wet batteries consisted of solution-filled glass jars and with electrodes dropped into each one. Wet cells are used to start most cars but these are also replaced by the dry cells these are also used to provide electricity backup to households.

### **3. Conductors and Insulators**

Materials through which electric current can pass through easily are called conductors of electricity or we can say any substance can be called as a conductor of electricity if it allows movement of charges through it. The electrons of the conductors can flow freely and hence can take electric current through them. Pure water or distilled water is a poor conductor of electricity. But the presence of even small amount of impurities makes water a good conductor. All the metals are conductors of electricity.

Those materials which do not allow electric current to pass through them are called insulators or known as Non-Conductors of electricity. Examples of insulators are glass, wood, rubber, pure water, and dry air. However, the impurities in water (impurities are substances like salts, dissolved in water) make it a conductor.

Insulators do not allow the flow of charges through them because their electrons are tightly packed with their particles.

- 4. **Extraction of aluminium**—Aluminium ore is called bauxite. The bauxite is purified to produce aluminium oxide, a white powder from which aluminium can be extracted. The extraction is done by electrolysis. The ions in the aluminium oxide must be free to move so that electricity can pass through it.

### **5. Chemical effect of Current**

When current passes through water, water gets ionised and the gases arising are hydrogen and oxygen. Splitting of hydrogen and oxygen in water is a chemical effect. Now we know that when an electric current passes through solution it ionizes and



breaks down into ions. Depending on the nature of the solution and the electrodes used, these three effects can be seen:

- (a) Metallic deposits on the electrodes can be seen.
- (b) Change in the colour of the solution can be observed.
- (c) A release of gas or production of bubbles in the solution can also be seen sometimes.

**(E) Fill in the blanks with the given words below :**

- |                |                 |                |
|----------------|-----------------|----------------|
| 1. electricity | 2. electrolysis | 3. insulators  |
| 4. rusting     | 5. reused       | 6. electrolyte |

**(F) Write true or false :**

- |         |          |          |         |          |
|---------|----------|----------|---------|----------|
| 1. True | 2. False | 3. False | 4. True | 5. False |
|---------|----------|----------|---------|----------|

**(G) Match the following :**

1. Anode—Negatively charged electrode
2. Potassium—Extracted using Electrolysis method
3. Titanium—Extracted using Reduction method
4. Cathode—Positively charged electrode
5. Wet cell batteries—Have the ability to recharge

**(H) Activity :**

**Do yourself.**

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## Chapter 15 : Some Natural Phenomena

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**(A) Multiple Choice Questions (MCQ) :**

Tick (✓) the correct answer :

- |        |        |        |        |        |        |
|--------|--------|--------|--------|--------|--------|
| 1. (b) | 2. (b) | 3. (a) | 4. (c) | 5. (c) | 6. (b) |
|--------|--------|--------|--------|--------|--------|

**(B) One word question answers :**

1. What is the unit of charge ? Coulombs and ampere second
2. The number of electrons in the atom is equal to the number of protons in the atom.
3. Which device is being used to measure the intensity of the earthquake—Richter scale.
4. Which branch of science deals with the study of earthquakes—Seismology.
5. Who invented the lightning— Benjamin Franklin
6. Protons have Positive charge.

**(C) Answer the following short questions :**

1. When a plastic comb is rubbed with dry hair, it becomes negatively charged. The negatively charged comb induces a positive charge on the pieces of paper which are neutral in nature. As we know that the unlike charges attract each other, plastic comb attracts tiny pieces of paper.

**2. Lightning Conductor**

The idea of using lightning conductor was first given by Benjamin Franklin about 250 years ago. A lightning conductor is an instrument used to protect buildings from the

harmful effects of lightning. Lightning is more likely to strike projecting objects such as trees, poles, buildings etc. because the material in them provides an easier path to the ground than air. A lightning conductor is a metallic conductor that is attached to the highest point on the building and connected to the earth with copper plate buried deep under the ground.

3. A lightning conductor is a metallic conductor that is attached to the highest point on the building. A lightning conductor is an instrument used to protect buildings from the harmful effects of lightning.
4. **The Earthquake prone areas of India are**—the region of Kashmir, the Western and Central Himalayas, some parts of Bihar, the Rann Kutch and the Andaman and Nicobar Islands fall in this zone
5. **Precautions to be taken during lightning**
  - (i) Do not use electrical appliance and switch them off immediately.
  - (ii) If your TV uses in antenna then disconnect it from the TV.
  - (iii) Avoid bathing under running water during thunderstorms and lightning.
  - (iv) As soon as you hear thunder, rush to a safer place.
  - (v) Avoid taking shelter under trees and metallic roof or umbrella with metallic rod.
  - (vi) Stay away from all types of water bodies because water is good conductor of electricity.
  - (vii) If you are travelling then take shelter inside a car or bus.
  - (viii) If outside, do not lie on the ground. Instead squat, bow on the ground, i.e, place your hand on your knees with your head between the hands.
  - (ix) Stay away from plumbing metallic lines.

**(D) Answer the following long questions :**

1. When two objects touch each other, or rubbed against each other, the movement of electrons may take place from one object to another. The object which loses electrons becomes positively charged. The object which gains electrons become negatively charged. In this case, the number of electrons lost is equal to the number of electrons gained and as a result, both objects will get equal positive and negative charge. Like charges repel each other and unlike attract. Objects that have property to attract or repel are called charged objects or electrified. The process of charging of an object is referred to as electrification.

When a body gains electric charge, the process is called charging.

When a body loses electric charge, the process is called discharging.

2. Charges are always transferred through good conductors. In electroscope, the charge from glass rod is transferred to silver leaves through the metallic rod. After some time, it is observed that silver leaves move back to the original position. The electric charge from silver leaves is transferred to the earth through the body of electroscope.

Thus, the silver leaves lose electric charge.

When charge is transferred to earth, the process is called Earthing.

### 3. Lightning and Thunderstorm

Lightning heats the air in the path so quickly that a loud sound is produced that we hear as Thunder. The upward movement of hot air and downward movement of cold air lead to stormy winds along with rainfall, lightning and thunder. These events together are called as thunderstorm. Thunderstorm is always accompanied by lightning. Lightning is a giant electric spark. It causes maximum damage.

#### Earthquake

Earthquake is a sudden shaking of the earth's crust which last for a very short time. It is caused by disturbance deep inside the earth's crust. Earthquake is another kind of natural phenomena, which causes large scale destruction of life and property.

### 4. Earthquake

Earthquake is a sudden shaking of the earth's crust which last for a very short time. It is caused by disturbance deep inside the earth's crust. When the plates brush past one other or when at times they get interlocked a disturbance is caused and it develops into an earthquake.

#### Safety measures to be followed during earthquake

- (i) Do not use lift in buildings.
- (ii) Stay away from electric poles, power line and sign boards.
- (iii) In case you are indoor, take shelter under a table and don't come out until the quake is over.
- (iv) Quake proof designs should be implemented, while building a house.
- (v) There should be proper fire fighting system in the house. Fire becomes a major hazard during and after an earthquake.
- (vi) People living in coastal areas should move to a safer place on higher grounds at the first warning for hint of an earthquake.
- (vii) If driving, avoid bridges or tunnels.

### 5. The measures that should be taken after a natural calamity and disaster—

1. Make sure you, your family members, and pets are safe.
2. Make sure everyone takes their go bag and your lock box of essential and financial documents.
3. Attend to physical injuries and emotional distress
4. If you have a home standing, but there is damage, secure your property
5. Take photos of the damage.

#### (E) Fill in the blanks with the given words below :

- |             |            |             |
|-------------|------------|-------------|
| 1. calamity | 2. thunder | 3. charges  |
| 4. earthing | 5. sudden  | 6. Benjamin |

#### (F) Write true or false :

- |          |         |          |          |         |
|----------|---------|----------|----------|---------|
| 1. False | 2. True | 3. False | 4. False | 5. True |
|----------|---------|----------|----------|---------|

#### (G) Match the following :

1. Natural disaster—Natural calamity
2. Benjamin Franklin—American scientist

3. Charles F. Richter—Richter scale
4. Loosening of soil—Landslides
5. Seismology—A branch of science

**(H) Activity :**

**Do yourself.**

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**Chapter 16 : Light**

**(A) Multiple Choice Questions (MCQ) :**

Tick (✓) the correct answer :

1. (a)      2. (b)      3. (a)      4. (b)      5. (c)      6. (b)

**(B) One word question answers :**

1. Where does the image form in a human eye ?—in lens.
2. Angle between normal and incident ray is called—angle of incidence.
3. Name one device which works on the principle of multiple reflections—kaleidoscope.
4. According to the principles of reflection, angle of incidence is always equal to what—Angle of Reflection.
5. Who invented the Braille system ?—Louis Braille.
6. Name the part of the eye which gives distinctive colour—IRIS

**(C) Answer the following short questions :**

1. Some carnivorous animals such as red foxes, tiger, lion, hyenas and owls use good night vision for hunting at night.
2. **Reflected ray :** The ray of the light that gets reflected back from the surface is called reflected ray.

**Myopia (Short-sightedness) :** When the focal length of the eye is shortened then a person is called as Myopic. In this disease the person is able to see the things near to them but will not be able to see the things clearly which are placed far from them due to the shift in focus.

**3. Kaleidoscope**

A kaleidoscope is a device that works on the phenomena of multiple reflections with the help of multiple mirrors. A kaleidoscope has a cylindrical structure with three plane mirrors inside it.

4. **Spectrum of Light or Light Spectrum**—Light spectrum means the visible spectrum, the range of wavelengths of electromagnetic radiation which our eyes are sensitive to is called spectrum of light.
5. **Reflection of Light**

If light travelling in one medium is sent back to the same medium after striking a second medium is said to be reflected. In simple words “When light rays fall on a highly polished smooth surface and return to the same medium, it is called reflection of light.”

**(D) Answer the following long questions :**

1. **Retina :** Retina is placed behind the lens. Retina has different nerve cells that detects the light and transform that into electrical impulses.

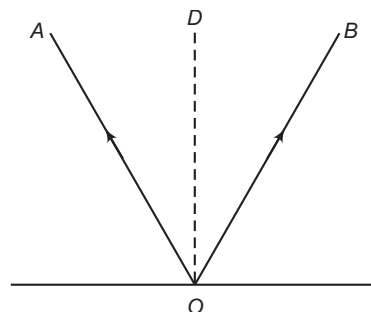
Retina has two parts which senses darkness and brightness, these are Rods or chopsticks and Cones.

**Blind spot :** There is one point on the retina where the nerve fibers enter the optic nerve. The image falling on this part of the retina cannot be seen and hence it is known as the blind spot.

2. **Laws of Reflection of light**

- (a) **First Law of Reflection :** The first law of reflection states that the incident ray, the reflected ray and normal at the point of incidence all lie in the same plane.

- (b) **The Second Law of Reflection :** The angle by which a ray of light is incident on a surface will always be equal to the angle by which it is reflected back from the surface.



Therefore in above image we can say that

$$\angle DOA = \angle DOB.$$

$$\text{i.e. } (\theta_i) = (\theta_r)$$

Both the above laws are applicable to all polished and smooth surfaces, whether plane or curved.

3. A polished and smooth surface is called as mirror. Reflection of light helps us to see most of the things around us. Reflection of light by a surface depends on the nature of the surface. Depending on the nature of the surface, there are usually two types of reflection : Regular reflection and diffused or irregular reflection. Regular reflection : A highly polished surface reflects a parallel beam of light in one direction; this is called as regular reflection or image. In regular reflection of light the parallel beams remain parallel after reflection. Irregular or Diffused reflection : An irregular surface reflects a parallel beam of light in different directions, this kind of reflection is called diffused reflection. In irregular reflection of light the parallel beams do not remain parallel after reflection.
4. A Periscope is an instrument that is used to look at objects that are not in the line of sight of the observer. With the help of periscope a person can see around corners and other obstructions. The Periscope works on the phenomena of multiple reflections of light. A periscope consists of a long-tube with a plane mirror at each end. The reflecting surfaces are parallel and are arranged at an angle of 45 degree inside the tube. The image formed by one mirror acts as the object for the other mirror. The main use of periscope is in submarines that remain under water and tanks and bunkers by the soldiers.
5. A rainbow which usually appears after the rain, you must have seen it as an arc of seven colours in the sky, it is known as the rainbow. The seven colours of a rainbow are red, orange, yellow, green, blue, indigo and violet these colours are sometimes abbreviated as VIBGYOR. The pattern which is formed by all these seven colours is

known as Spectrum of colours. When all these seven colours are mixed together the white light forms, so we can say that the white light is made by the combination of these colours. Therefore, now we can comprehend that the sunlight is also formed by the combination of these seven colours. This can also be proved by some other methods and activities.

**(E) Fill in the blanks with the given words below :**

- |             |               |             |
|-------------|---------------|-------------|
| 1. source   | 2. reflection | 3. inverted |
| 4. spectrum | 5. Iris       | 6. codes    |

**(F) Write true or false :**

- |          |         |          |          |         |
|----------|---------|----------|----------|---------|
| 1. False | 2. True | 3. False | 4. False | 5. True |
|----------|---------|----------|----------|---------|

**(G) Match the following :**

1. Pupil—Controls light
2. Cells in Braille character—6 dots
3. Convex mirror—Converging mirror
4. Healthy vision—Vitamin A in diet
5. Multiple reflection—Periscope

**(H) Activity :**

**Do yourself.**

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## Chapter 17 : Stars and Solar System

**(A) Multiple Choice Questions (MCQ) :**

Tick (✓) the correct answer :

- |        |        |        |        |        |        |
|--------|--------|--------|--------|--------|--------|
| 1. (a) | 2. (c) | 3. (a) | 4. (c) | 5. (b) | 6. (a) |
|--------|--------|--------|--------|--------|--------|

**(B) One word question answers :**

1. Who landed on the moon for second time—Edwin Aldrin
2. Which star indicates the north direction—the North Star
3. Name the natural satellite of Earth—Moon
4. Write any two artificial satellites name—IRS, Insat
5. Which is the largest planet in the solar system ?—Jupiter
6. Ursa Major is known as—Constellation

**(C) Answer the following short questions :**

1. **Asteroids :** These are rocky planetary bits orbiting around sun. Asteroid belt lies between Mars and Jupiter.
2. On July 21, 1969 (Indian time), Neil Armstrong landed on the moon for the first time.
3. The Sun's rays fall directly on the part of the moon facing earth. In this position we see the moon as a full disc of light. This position of moon is known as full moon.
4. This position of moon, when it appears dark on earth is known as new moon. In some positions we see the moon not as a full disc but as a crescent.

5. A fortnight later, you'll not be able to see any moon at all. It is a new moon night also known as new moon night or 'Amavasya'.

**(D) Answer the following long questions :**

**1. Celestial Bodies**

The moon, the sun, and all the objects, shining in the night sky are known as the Celestial Bodies. This includes every natural object that is located outside the Earth's atmosphere, such as the Moon, the Sun, an asteroid, planet, or star. The Kuiper belt contains many celestial bodies. Even an asteroid in space is a celestial body.

**Features of Celestial Bodies.**

Some of the celestial bodies are very hot and big. They are composed of gas and have their own light and heat. These emit heat in large amounts. Such celestial bodies are known as stars. The sun is also a star.

**2. Phases of the Moon**

The various shapes of the bright part of the moon as seen during a month are called phases of moon. The moon revolves round the earth. It also revolves round the sun along with the earth. The various stages of the moon during a month are shown in figure (See figure in text book).

The part of the moon facing earth does not receive light from the sun. Hence it appears dark. The other part of the moon that is facing away from earth is lit by the sun light. This position of moon, when it appears dark on earth is known as new moon. In positions 2, 3 and 4, we see the moon not as a full disc but as a crescent. Position 2 of the moon is known as crescent moon, Position 3 as first quarter and position 4 as Gibbous (bright part is greater than a semicircle) moon. In position 5, the Sun's rays fall directly on the part of the moon facing earth. In this position we see the moon as a full disc of light. This position of moon is known as full moon.

Between the positions 1 and 5, the bright portion of moon increases. It is called waxing phase of the moon. We have "Amavasya" at position 1, and "Purnima" at position 5. During positions 6, 7, 8 and 1, the moon wanes, that is the bright portion of moon becomes smaller and smaller. The time period between one full moon to the next full moon is slightly longer than 29 days.

**3. Other members in our solar system are:**

- (i) **Asteroids :** These are rocky planetary bits orbiting around sun. Asteroid belt lies between Mars and Jupiter.
- (ii) **Comets :** These are celestial bodies that revolve around the sun. It appears generally as a bright head with a long tail. The tail of a comet is always directed away from the Sun. A comet is made up of rock, dust, water, ice, and frozen gases.
- (iii) **Meteors and Meteorites :** Meteoroids are chunks of rock or particle of debris in our solar system. They are smaller than comets. When meteoroids enter the Earth's atmosphere they are called meteors. Most meteors burn up in the atmosphere, but if they sustain the frictional heating and strike the surface of the Earth they are called meteorites. As a meteor glows brightly when it falls to the ground it is called a shooting star.



(iv) **Satellites** : A body revolving around another body is called a satellite.

Moon is the natural satellite of the Earth. Some planets also have natural satellites.

4. **Planets** : Planets reflect sunlight that is incident on them. They have no light of their own, so they don't twinkle like the stars. Planets have definite paths called orbits in which they revolve around the sun. There are eight planets in our solar system : Mercury, Venus, Earth, Mars, Jupiter, Saturn, Uranus, Neptune. Venus is the brightest planet in the night sky. Jupiter is the largest planet of the solar system.
5. The groups of stars forming some kind of recognizable figures or patterns are known as constellations. Ursa Major is one such constellation. In archaic times, people used stars to determine directions during the night. The North Star known as the Pole Star indicates the north direction. A pole star is a visible star. It is approximately aligned with the Earth's axis of rotation. This means that the apparent position of Pole Star is close to one of the celestial poles, and it lies approximately directly overhead when viewed from the Earth's North Pole or South Pole. The Pole Star always remains in the same position in the sky. You can locate it with the help of the Saptarishi. Constellations appear to move from east to west as Earth rotates from west to east. Orion—the Hunter, Ursa Major—the Great Bear or Saptarishi, Cassiopeia are some constellations.

**(E) Fill in the blanks with suitable (given) words :**

- |             |               |             |
|-------------|---------------|-------------|
| 1. Kuiper   | 2. North star | 3. orbit    |
| 4. luminous | 5. earth      | 6. sunlight |

**(F) Write true or false :**

- |          |         |         |          |          |
|----------|---------|---------|----------|----------|
| 1. False | 2. True | 3. True | 4. False | 5. False |
|----------|---------|---------|----------|----------|

**(G) Match the following :**

1. Largest Planet—Jupiter
2. Ursa Major—Constellation
3. Artificial Satellite—INSAT
4. Asteroid belt lies between—Mars and Jupiter
5. Shooting stars—Meteors

**(H) Activity :**

**Do yourself.**