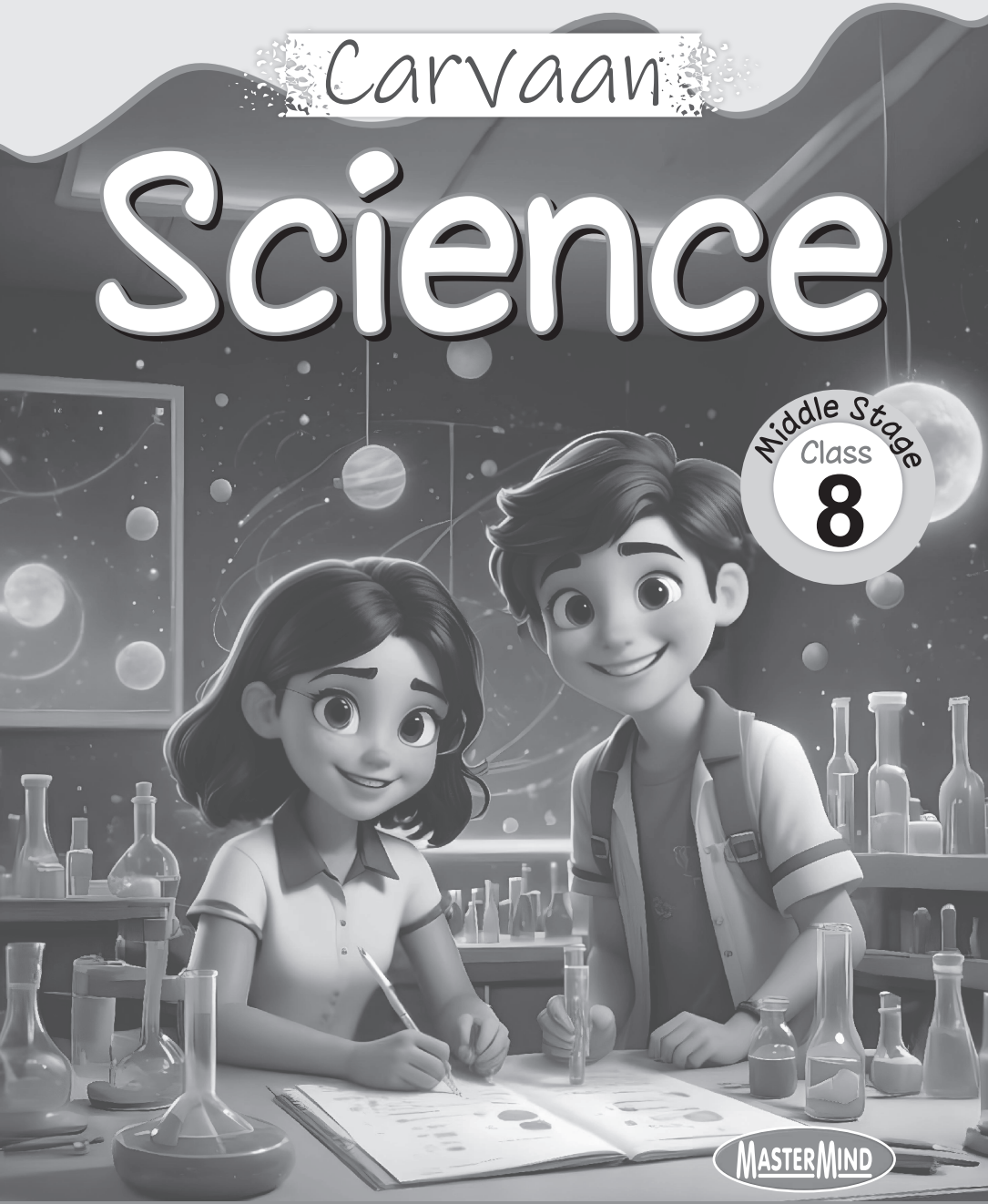
Teacher's Manual

Carvaan

Science



Chapter 1 : How Crops are Produced?

1. (a) (i) (b) (ii) (c) (iii) (d) (i) (e) (i)

2. (a) Urea, superphosphate (b) Neem, tulsi and aloe vera (c) weeding
(d) sowing seeds uniformly over the entire field
(e) planting seedlings in the field

3. (a) (v) (b) (iii) (c) (ii) (d) (i) (e) (iv)

4. (a) True (b) False (c) False

5. (a) Kharif crops: Crops sown in the rainy season (monsoon) and harvested in the autumn.
(b) Agriculture: The practice of farming, including cultivation of the soil and the rearing of animals, for various products.
(c) Types of crops based on products:
Food crops: Rice, wheat, maize.
Cash crops: Cotton, sugarcane, tobacco.
Horticultural crops: Fruits, vegetables.
(d) Methods of sowing seeds:
Broadcasting, drilling, dibbling, seed dropping, transplanting.

6. (a) Broadcasting and tilling:
Broadcasting: Spreading seeds evenly over the soil surface.
Tilling: The process of preparing soil for cultivation by plowing or digging.
(b) Need for application of fertilizers:
Provides essential nutrients to the soil.
Enhances soil fertility.
Promotes healthy plant growth and higher yields.
(c) Multiple cropping and field fallowing:
Multiple cropping: Growing two or more crops in the same field in a single year to maximize productivity.
Fallowing: Allowing a field to rest without planting to restore soil fertility.

7. (a) Methods employed for crop production:
Soil Preparation: Plowing, leveling, and adding organic matter.
Sowing: Planting seeds using various methods.
Fertilizers: Adding nutrients to the soil.
Irrigation: Providing water to crops.
Harvesting: Cutting and gathering mature crops.

(b) Brief note on:

(i) Kharif and Rabi crops:

Kharif: Sown in monsoon, harvested in autumn.

Rabi: Sown in winter, harvested in spring.

(ii) Soil preparation:

Plowing, leveling, and adding manure to make the soil suitable for planting.

(iii) Sowing:

The process of planting seeds in the soil using various methods.

(iv) Fertilizers:

Substances added to soil or plants to improve growth and yield.

(v) Irrigation:

Supplying water to crops artificially when there is a deficiency.

(vi) Harvesting:

Cutting and collecting mature crops for use.

(vii) Crop protection:

Measures to prevent and control pests, diseases, and weeds.

Chapter 2 : Microorganisms : Friend and Foe

1. (a) (ii) (b) (iv) (c) (i) (d) (i) (e) (iii)

2. (a) caused by HIV (b) 5.50 (c) saprophytic, parasitic (d) Alexander Flemming

3. (a) (v) (b) (iii) (c) (iv) (d) (ii) (e) (i)

4. (a) False (b) True (c) False

5. (a) Examples of algae:

Spirogyra and Chlorella.

(b) Structural components of a bacterium:

Capsule, cell wall, cell membrane, cytoplasm, ribosomes, flagellum, and nucleoid.

(c) Gram-negative and Gram-positive bacteria:

Gram-negative bacteria have a thinner peptidoglycan layer and an outer membrane.

Gram-positive bacteria have a thicker peptidoglycan layer.

(d) Measles is a highly contagious viral infection caused by the measles virus. It is characterized by symptoms like fever cough, runny nose, sore throat, and a distinctive red, blotchy rash.

6. (a) Algae:

Simple, autotrophic organisms found in aquatic environments.

Range from unicellular to multicellular forms.

Perform photosynthesis.

(b) Protozoa:

Unicellular, eukaryotic organisms.

Classified based on their locomotion (amoeboid, flagellated, ciliated).

Heterotrophic and often found in water.

(c) Pasteurization and Sterilization:

Pasteurization: Heat treatment to kill or deactivate harmful microorganisms in liquids, such as milk and fruit juices.

Sterilization: Complete elimination of all microorganisms and their spores, often through heat or chemicals.

7. (a) Organisms that cannot be seen by naked eye are called microbes. The branch of biology dealing with the study of microbes is called microbiology. The person who studies and practically applies microbiology is called a microbiologist.

Characteristics Features of Micro-organisms

1. Microbes are omnipresent : They are present throughout in the environment. They are found on the rocks, in the air and within and on the water surface too.

2. Growth and reproduction : Microbes grow and reproduce in the similar manner as other living beings do.

3. Habit : Microbes can belong to a variety of habits as hot springs, salty lakes, fresh water, rocky surface, air, etc.

(b) It is a process of treatment of food so as to slow down the food spoilage by bacteria, fungi and other microbes.

Requirement of food preservation : As we know micro-organisms are omnipresent. They can spoil our food and thus can lead to various food and water borne diseases. To prevent these diseases proper preservation of food and purification of water is desired as well as required.

Methods of food preservation

(a) Drying : Drying aims at reduction of water content. As moisture is a very favourable agent to promote microbial growth so its reduction automatically suppresses microbial growth and activity.

(b) Low temperature : Metabolic activities are retarded at low temperature. As a result of which growth and reproduction of microbes is retarded and enzymatic activities are also reduced. Temperature can be reduced by storage of food items in either of the following:

Refrigerator (40- 70°C)

Cold storage (10-40°C)

Freezer(> 0°C)

(c) High temperature : As all the living organisms have the sustainable temperature so do microbes. If temperature is raised above the suitable temperature that they can sustain, they will be killed and destroyed.

(c) Bacteria are a friend

(a) Fermentation : Curding of milk is achieved with the help of a bacteria called Lactobacillus. Wine, vinegar, beer, etc. all are manufactured by the action of bacteria on the corresponding substrate. Cheese, yoghurt and butter are all produced by fermentation.

(b) Digestion of food : Bacteria help in the digestion of cellulose in ruminants e. g., cows and buffalos.

(c) Nitrogen fixation : Nitrogen fixing bacteria live in the nodules of leguminous plants. They convert atmospheric nitrogen into nitrates and thus make them available for plants. Example of nitrogen fixing bacteria include Rhizobium.

(d) Maintenance of fertility soil : Bacteria are decomposers. They decay dead remains of living beings and add up the decomposed matter to the soil thus maintaining its fertility.

(e) Medicinal application : Bacteria or their products that inhibit the growth of other microbes or kill them are called antibiotics can be used for the treatment of microbial diseases. Examples of antibiotics include Streptomycin and Gramicidin.

(f) Industrial uses : Bacteria are useful in tobacco, leather and jute industries. Tanning is done with the help of bacteria. In the jute industry, jute plants are submerged in water, where bacterial action separates the fibres from rest of the tissues.

Chapter 3 : Coal and Petroleum

1. (a) (i) (b) (i) (c) (iii) (d) (iii) (e) (iii)

2. (a) brown coal, soft coal (b) asphalt, road tar (c) crude oil

(d) making lubricants

3. (a) (iv) (b) (ii) (c) (i) (d) (iii) (e) (v)

4. (a) True (b) True

5. (a) Composition of natural gas : Mainly methane (CH_4) with small amounts of ethane, propane, butane, and other gases.

(b) Petroleum refining : The process of separating crude oil into its

components (fractions) based on their different boiling points.

(c) Fields of natural gas in India : Situated in Krishna Godavari Basin, Mumbai High, Tripura, and other regions.

(d) Some alternatives to petrol are electric cars, biofuels(like plant based fuels) hydrogen and fuels made from renewable sources.

(e) Top five coal-producing countries :

1. China 2. India 3. United States 4. Australia 5. Indonesia.

Top five petrol (crude oil) producing countries.

1. United States 2. Saudi Arabia 3. Russia 4. Canada 5. Iraq.

6. (a) Uses of coal and petroleum : Coal: Used for electricity generation, steel production, and as a fuel in various industries.

Petroleum: Used for fuel (gasoline, diesel), lubricants, chemicals, and asphalt.

(b) Exhaustible vs. Inexhaustible resources : Exhaustible: Finite resources that can be depleted, e.g., coal, petroleum.

Inexhaustible: Renewable or virtually limitless resources, e.g., sunlight, wind.

(c) Types of coal : Anthracite, bituminous, sub-bituminous, lignite (in order of increasing carbon content).

7. (i) Petroleum:

Formation: Derived from the remains of marine organisms over millions of years.

Composition: Hydrocarbons (alkanes, alkenes, aromatics).

Uses: Fuel, lubricants, petrochemicals.

(ii) Natural gas:

Composition: Predominantly methane with other hydrocarbons.

Sources: Extracted from natural gas fields.

Uses: Fuel for heating, electricity generation, and as a feedstock for chemicals.

(iii) Coal:

Formation: Result of the decomposition of plant material over geological ages.

Types: Anthracite, bituminous, sub-bituminous, lignite.

Uses: Primary source of electricity generation, steel production, industrial processes.

Chapter 4 : Combustion and Flame

1. (a) (i) (b) (ii) (c) (i) (d) (iii)

2. (a) Dark (b) Carbon monoxide (c) Calorific value (d) hydrocarbons, carbon

3. (a) (v) (b) (i) (c) (iii) (d) (ii) (e) (iv)

4. (a) True (b) False (c) False (d) False

5. (a) Solid fuel: Fuel in a solid state, like wood or coal.

(b) Processed fuel:

Fuel that has undergone a treatment or refinement process for better efficiency or properties.

(c) Flame: The visible, gaseous part of a fire.

(d) Explosion: A sudden release of energy, often accompanied by a shockwave, due to a rapid chemical reaction.

6. (a) Types of combustion :

(i) Rapid combustion : It takes place at a very fast speed.

(ii) Slow combustion : It takes place at a slow speed.

(iii) Spontaneous combustion : It is that type of combustion in which a substances catches fire without even being ignited.

(b) Combustible substance : Substance can be burn easily in the presence of air or oxygen to release heat and light energy are called combustible substance.

No-combustible substance : Substance that cannot burn in the presence of air to release heat and light energy are called non-combustible substances.

(c) How carbon dioxide extinguishes a fire:

Carbon dioxide displaces oxygen, reducing the oxygen concentration and suppressing the combustion process.

(d) Calorific value of a fuel:

The amount of heat energy released per unit mass of the fuel burned, usually measured in joules per gram or kilo joules per kilogram.

7. (a) Combustion is a chemical process in which burning of some substance takes place in the presence of air or oxygen so as to produce heat and light or only heat.

On the basis of the ability of substances to undergo combustion they can be of following two types :

1. Combustible substances : Substances that can burn easily in the presence of air or oxygen to release heat and light energy are called combustible substance.

2. Non-combustible substances : Substances that cannot burn in the presence of air to release heat and light energy are called non-combustible substances.

Conditions necessary for combustion:

Several parameters are required to be present for combustion to take place. They include :

(a) Combustible substance : A substance that can burn in presence of air or oxygen is known as combustible substance.

(b) Air or Oxygen : In the absence of oxygen, combustion is not supported as it is often seen in the case of fire that we try to cut the oxygen supply to stop it.

(c) Ignition temperature : The minimum temperature required for a substance to cath fire under normal atmospheric conditions is called ignition temperature of the substance.

Products of Combustion:

If the amount of oxygen available is sufficient then carbon dioxide, water and energy are produced. And this type of combustion is called complete combustion.

If the amount of oxygen available is insufficient then the products obtained include carbon monoxide, water and energy. And this type of combustion is called incomplete combustion.

(b) A fire extinguisher is a device which is used to extinguish small fires.

Fire extinguishers are fitted in big malls, colleges and hospitals, etc.

Designing of fire extinguisher : Fire extinguisher is a metallic cylinder with a plunger at its bottom. Just above the plunger is fitted a test tube filled with concentrated sulphuric acid. This tube is protected by a wire gauze cage in turn. Rest portion of the cylinder is filled with sodium bicarbonate solution and its top is scaled by wax scal.

Working :

Fire

↓

Plunger hits up the tube as a result of which

↓ $2NaHCO_3 + H_2SO_4 \longrightarrow Na_2SO_4 + 2H_2O + 2CO_2$

Acid escapes out to react with sodium bicarbonate

↓

CO_2 produced

↓

It is directed towards the fire and CO_2 extinguishes the fire.

(c) Candle consists of ⊳ Wax + Wick (Natural wax produced in the behive)

The wax serves as a fuel. It is usually a hydrocarbon made from

crude oil. The wick is made of a material that absorbs liquids such as water or molten wax.

Wax can be : Beeswax

Soya (produced form of soyabean oil)

Plant wax (wax secreted by plants)

Or paraffin or paraffin + plastic can be used.

(hydrocarbons made from crude oil)

Wax (Solid form) $\longrightarrow$ Liquid wax $\longrightarrow$ Vaporized

wax + supporter of combustion (O_2) $\longrightarrow$ Flame generated

Zone of a candle flame

Candle flame consists of three zones :

(a) Outer zone

(b) Middle zone

(c) Innermost zone

(d) Characteristics of a good fuel

A substance is a good fuel if :

- It is cheap. It is easily available
- It is easy to store It is of high calorific value.
- It shows complete combustion without leaving any residue behind.
- Its ignition temperature is low but above the normal room temperature.
- Its rate of burning is burning is moderate. Gaseous fuel is considered to fulfill maximum of above mentioned criteria, so it is considered as the best fuel.

Classification of fuels

1. On the basis of their physical state fuels can be :

(i) Solid fuel : Fuel in solid state at room temperature is solid fuel, for examples wood, coal, coke, animal dung, etc.

(ii) Liquid fuel : Fuel in liquid state at room temperature is known as *liquid fuel*, for example, LPG, diesel, kerosene, spirit, etc.

(iii) Gaseous fuel : Fuel in gaseous state at room temperature is known as *gaseous fuel*, for example, biogas, water gas, natural gas.

(e) Impact of burning fuels on air:

Release of pollutants like carbon dioxide, sulfur dioxide, nitrogen oxides, and particulate matter.

Contributes to air pollution, greenhouse gas emissions, and climate change.

Chapter 5 : Conservation of Plants and Animals

1. (a) (i) (b) (i) (c) (iv) (d) (i) (e) (iii)

2. (a) the veriety of life (b) Gir National Park, Jim Corbett Park (c) in their natural habitat (d) a biosphere reserve

3. (a) (iii) (b) (v) (c) (ii) (d) (iv) (e) (i)

4. (a) True (b) False (c) True (d) False

5. (a) Endemic species:

Species that are native to and found only in a specific geographic area.

(b) Five threats to biodiversity:

Habitat loss, pollution, overexploitation, invasive species, climate change.

(c) Red Data Book:

A record of endangered and vulnerable species, providing information on their status and conservation needs.

6. (a) Definitions:

(i) Endangered: Species facing a high risk of extinction.

(ii) Critically endangered: Species at an extremely high risk of extinction.

(iii) Vulnerable: Species likely to become endangered if conservation measures are not taken.

(iv) Extinct: No longer in existence.

(v) Data deficient: Insufficient data to determine the conservation status.

(vi) Endemism: The ecological state of being unique to a particular geographic location.

(b) Migration:

The regular seasonal movement, often north and south, undertaken by many species.

Types include altitudinal, latitudinal, and daily or diurnal migration.

(c) Ecosystem:

A community of living organisms interacting with each other and their physical environment.

7. (a) Biodiversity means the variety of life forms on the earth.

Biodiversity is rich near the equator and declines as we move towards higher altitude due to unfavourable living conditions there.

Animal species are called *fauna*.

Plant species are called *flora*.

1. Biodiversity is threatened

(i) Population growth (ii) Deforestation

(iii) Habitat loss (iv) Pollution

(v) Non-native species

2. Conservation of Biotic Diversity or Biodiversity

International convention on biodiversity is an agreement that is made by the governments of different countries for the conservation of biodiversity. Different practices for conservation of biodiversity that have been suggested include :

(a) Preparation of list of endangered and threatened species to protect them from extinction.

(b) Birth rate should be controlled, so as to allow sustainable development.

(b) Red Data Book

- Red Data book is maintained by International Union for the Conservation of Nature and Natural Resources (IUCN).
- IUCN is a group of organizations and scientific experts that works for the conservation of biodiversity.
- Red Data Book is the state document that maintains the record of rare and endangered species of plants and animals within the territory of the state or country.

Different categories that are used to describe threatened species include the following :

(a) Extinct (EX) : A group is considered to be extinct when there is surity that even the last individual of the group has died.

(b) Extinct in the wild (EW) : These are those that are known to survive only in captivity or cultivation or as a naturalized population outside its historic range.

(c) Critically endangered (CR) : These are those that are facing an extreme high risk of extinction in the world.

(d) Endangered (EN) : These are those that are facing a high risk of extinction in the world.

(e) Vulnerable (VU) : These are those that are facing a high risk of endangerment in the world.

(f) Near Threatened (NT) : These are those that are likely to become endangered in the near future.

(g) Least concern (LC) : This category includes those that are at lowest risk. They are abundant and widespread.

(h) Data Deficient (DD) : This category includes those whose data is not enough to make an assessment of the risk of extinction.

Chapter 6 : Reproduction in Animals

1. (a) (i) (b) (iii) (c) (i)

2. (a) Puberty (b) Estrogen, progesterone (c) falloplan tubes

3. (a) (ii) (b) (i) (c) (iii) (d) (v) (e) (iv)

4. (a) False (b) False (c) True (d) True

5. (a) Fertilization : The fusion of male and female gametes to form a zygote.

(b) Internal fertilization : The union of gametes inside the body of one of the parent organisms.

(c) Unisexual organisms : Organisms with either male or female reproductive organs.

6. (a) Fertilization : Fusion of male and female gametes to form zygote is called fertilization. Fertilization can be of two types on the basis of site of its occurence :

1. **External fertilization :** Fertilization taking place outside the animal body is called external fertilization.

2. **Internal Fertilization :** Fertilization taking place inside the body of organisms is called internal fertilization.

(b) Gestation period : The period during which an organism develops inside the womb, from fertilization to birth.

7. (a) Asexual reproduction

- It is a type of Reproduction that involves only a single parent.
- It does not include gamete formation.

Types of asexual reproduction include :

(i) Binary fission

Process :

- Enlargement of a cell
- Division of the nucleus

(ii) Budding

Process

Development of protuberance called bud.

↓

Enlargement of the bud

↓

Followed by growth

↓

Detachment of the new individual from parent organism.

Examples of organisms reproduce by budding : Hydra,

Sponges, etc.

(iii) Spore formation

Process :

Spores are produced in parent cell

↓

Spores are dispersed

↓

Each spore germinates to give rise to a new individual.

Examples of organisms that reproduce by spore formation include : Bread mould, Rhizopus.

(b) Sexual Reproduction

(i) It is a type of reproduction that involves two parents.

(ii) It involves the fusion of male and female gametes to produce zygote.

Sexual reproduction involves male and female both.

Human Reproduction : There are two types of human reproduction.

1. Male reproductive system

2. Female reproductive system

1. Male reproductive system : Human beings reproduce sexually.

Male reproductive system comprises of :

(a) Pair of testes

These are present inside the scrotal sac. Male sex cells or male gametes called *sperms* are produced by testes. Testoster-one hormone is also produced by it.

(b) Scrotal sac : It is a bag like structure. Its function is to hold up the pair of testes outside the abdominal cavity.

(c) Epididymis : It is a long coiled tube. Its function is the temporary storage of sperms.

(d) Sperm duct or vas deferens : A long tube between testes and urinary bladder meant for transportation of sperms to the urethra.

(e) Urethra : A part of excretory system that serves as a temporary storage of sperms.

(f) Penis : Penis is meant for discharge of sperms.

2.Female reproductive system : Female reproductive system comprises of :

(a) Pair of ovaries : Ovaries produce ovum or egg cells or female gamete. Female sex hormones called *oestrogen* and

progesterone are also produced by ovaries.

(b) Fallopian tubes of oviduct : The tubes connecting ovaries with uterus are oviducts. Fertilization takes place in fallopian tube.

(c) Uterus : Uterus is a womb where the development of a baby takes place.

(d) Cervix : Ring of muscles at lower end of uterus.

(e) Vagina : Vagina is the tube that leads to the uterus. It is called as the *birth canal* as baby is born through this passage, only after completion of 9-month term in case of human beings.

(f) Vulva : Opening of vagina is called vulva.

(d) Brief note on the terms:

(i) Ovulation: The release of an egg from the ovary during the menstrual cycle.

(ii) Menstruation: The shedding of the uterine lining in females, typically occurring monthly.

(iii) Testis: Male reproductive organ that produces sperm and testosterone.

(iv) Ovary: Female reproductive organ that produces eggs and hormones.

Chapter 7 : Reaching the Age of Adolescence

1. (a) (iii) (b) (i) (c) (i) (d) (ii)

2. (a) sexual (b) Endocrine (c) Testosterone (d) pheromones (e) balanced and nutritious

3. (a) (iv) (b) (iii) (c) (v) (d) (ii) (e) (i)

4. (a) True (b) True (c) False (d) True (e) False

5. Here are the odd ones out along with the reasons:

(a) Insulin – The other three (Estrogen, Testosterone, Progesterone) are sex hormones, while Insulin is a metabolic hormone.

(b) Economic growth – The other three (Mental growth, Social growth, Emotional growth) are aspects of human development, whereas Economic growth refers to financial progress.

(c) Goitre – The other three (Adam's apple, Voice box, Larynx) are parts of the throat related to voice, while Goitre is a thyroid disorder.

(d) Menstruation – The other three (Menarche, Menopause, Ovulation) are specific stages in the reproductive cycle, whereas Menstruation is a recurring process.

6. (a) Puberty is the period of onset of sexual maturity in humans. The period of transition or change of a child into an adult human being

is called adolescence. Puberty is the period of onset of sexual maturity in humans.

(b) The most conspicuous change during puberty is the development of secondary sexual characteristics, such as breast development in girls, facial hair growth in body, and voice deepening in boys.

(c) During puberty, the voice box (larynx) in males grows larger and the vocal cords become thicker. This causes the voice to deepen and sometimes crack or break temporarily.

(d) A hormone is a chemical messenger secreted by endocrine glands that regulates various physiological processes in the body, such as growth, metabolism and reproduction .

7. (a) The term used for the secretions of endocrine glands responsible for changes in the body is hormones.

(b) (i) Puberty is the period of onset of sexual maturity in humans. During this stage, both the male and the female reproductive organs become functional, making the individuals capable of reproduction.

(ii) Adolescence: The period of transition or change of a child into an adult human being is called adolescence.

(c) Human body cells contains 23 pairs of chromosomes. The last pair of chromosome, however, differs in males and females. All other pairs are similar in both males and females.

The last pair of chromosomes (consisting of 2 chromosomes) which is different in males and females, is called the sex chromosome.

There are two kinds of sex chromosomes. They are called X and Y chromosomes.

In the males, the last pair of chromosome consists of one X chromosome and another Y chromosome. In other words, in males sex chromosomes are of XY type.

In the females, both the chromosomes of the last pair are same, and these of X chromosomes. So, the sex chromosomes in females are of XX type.

(d) The major changes that take place in the body during puberty. In both boys and girls.

(i) Growth spurt (increase in height and weight).

(ii) Development of sweat and oil glands (leading to ache).

(iii) Growth of public and underarm hair.

(iv) Emotional and behavioral changes.

(e) Adam's apple is the prominent bulge in the throat formed by the

enlarged larynx (voice box) during puberty in boys. It cause the voice to deepen and is more noticeable in males than in females.

8. (a) The changes associated with puberty are under the influence of certain chemical substances produced in our body. These chemicals are known as the hormones and the organs secreting these hormones are called endocrine glands. Endocrine glands are ductless and pour their secretions directly into the blood stream. The hormones are secreted in minute quantities. They circulate in the blood but produce their effect on a specific target organ or the target site.

At puberty, the tests of human male produce a hormone called testosterone. It is this testosterone that brings about changes in the human male, regulates the development of secondary sexual characters (organs of reproductive system but not involved in gamete production) and leads to the maturation of the accessory sex organs. Testosterone also regulates sperm production in the males. The ovaries of human female produce the female hormones, for example, estrogen which helps in menstrual cycle.

(b) Apart from the sex hormones, our body also produces several other hormones with the help of endrocrine system. The production of all these hormones is under the control of the pituitary or the master gland.

- The thyroid gland present in the throat region produces a hormone called thyroxine, which regulates the utilization of proteins, fats and carbohydrates in our body. This hormone requires iodine for its formation. Lack of iodine leads to the swelling of this gland, a condition called goiter.
- The pancreas produces insulin hormone responsible for maintaining blood sugar level in our body. Improper secretion of insulin hampers the blood sugar level, a condition called diabetes.
- Endocrine glands, called adrenal glands, are present just above the kidneys. One of the hormones produced by these glands is adrenaline, which is also called the emergency hormone as it prepares us to face stressful situations.
- The pituitary gland secretes a hormone called the growth hormone, which regulates the growth of our body, especially the bones. Over secretion of this hormone causes an exceptional increase in the length of a person, a condition called gigantism. Under secretion of the growth hormone, however, causes an abnormally short stature, a condition called dwarfism.

(c) At the onset of puberty, every month, an ovum gets matured in either of the ovaries of females and is released into the fallopian tube. This is called ovulation. It occurs in anticipation of fertilization. In case the

ovum is not fertilized, it degenerates and, along with the lining of the uterus, additional blood vessels are shed off as menstrual blood through the vagina. This is called menstruation. This will happen every 28-30 days in a female who has attained sexual maturity.

The beginning of menstruation or the first menstrual cycle is known as menarche. The sequence of events involving maturation of an ovum, ovulation and menstrual flow constitutes a cycle called the menstrual cycle. The menstrual cycle comes to an end at the age of about 45-50 years and this phase in the life of the female is called menopause. Menopause marks the end of the reproductive phase in the life of a female.

In males, the reproductive phase starts with the onset of puberty (at the age of about 13 years). The reproductive phase lasts life-long in males.

(d) The reproductive organs are testes and ovaries which produce the gametes, i.e., sperms in males and ova in females. In girls, breasts begin to develop at puberty and boys begin to grow facial hair, that is, moustaches and beard. As these features help in distinguishing the male from the female, they are called secondary sexual characters. Boys also develop hair on their chest. In both boys and girls, hair grows under the arms and in the region above the thighs or the pubic region

Chapter 8 : Force and Pressure

1. (a) (i) (b) (ii) (c) (i) (d) (iii) (e) (i)

2. (a) motion, deformation (b) contact (c) repel (d) gravity (e) force applied per unit area

3. (a) (iv) (b) (i) (c) (ii) (d) (v) (e) (iii)

4. (a) True (b) True (c) True (d) False

5. (a) Manometer : An instrument for measuring pressure, typically the pressure of liquids and gases.

(b) Resultant force : The single force that can replace a system of forces, producing the same effect as the original forces combined.

(c) Five examples where pressure exerted by solids, gases and liquids is beneficial: 1. Hydraulic Brakes. 2. Syringes 3. Airplanes 4. Bridges & buildings 5. Scuba diving.

(d) The coaster sticks due to air pressure and surface tension, which create a seal that holds it in place.

6. (a) Methods to reduce frictional force : Lubrication, polishing, using ball bearings, streamlining.

(b) Pressure exerted by solids: Solids exert pressure due to the force applied over a specific area.

(c) Pressure exerted by fluids : Yes, fluids (liquids and gases) exert

pressure.

Characteristic features: Pressure in fluids is transmitted equally in all directions, and it increases with depth.

(d) Body leaving Earth's gravitational field : The body experiences weightlessness in space due to the absence of gravitational force.

7. (a) Any influence that can cause motion or move some object is called as force.

Interaction of Objects and Force

Until and unless the body applying the force does not interact with the body that needs to be moved on, force will not act or motion will not occur.

Resultant force : Total amount of force acting on the object is equal to the resultant force.

Effects of force

Force can generate the following effects :

(i) Change of direction of a moving object.

(ii) Can make the moving object move faster.

(iii) Can make the moving object move slower.

(iv) Can change the size of some object.

Types of Force :

On the basis of interaction between any two objets, there are two types of the force :

(a) **Contact force :** This kind of force comes into play when an object interacts with another object directly by touching it.

(b) **Non-contact forces :** These forces come into play even when the objects are not in contact.

(b) Force per unit area exerted vertically on the surface of an object is called pressure. Pressure is denoted by P.

$$\text{Pressure} = \frac{\text{Force}}{\text{Area}} \quad \text{or} \quad P = \frac{F}{A}$$

Pressure is directly proportional to force and inversely proportional to the area. This means, more the area, less will be the pressure and more the force higher will be the pressure.

S.I. unit for measurement of pressure is N/m^2 or 1 Pascal in honour of Blaise Pascal.

Pressure exerted by solids

Pressure exerted by a solid depends on its area of action. More the area, less will be the pressure and vice-versa.

Pressure exerted by Liquids

Liquids do not have a specific shape, they take the shape of the vessel in which they are poured. Pressure exerted by liquids

depends on their density and height of the liquid column.

Manometer

It is a device which is used for the measurement of pressure. Manometer consists of a U-shaped glass tube that is filled with liquid mercury (because its density is high).

Pressure exerted by gases

Gases also exert pressure. Just like a liquid, gases too exert pressure in all the directions. Pressure exerted by gases is equal in all the directions of a container which contains it.

(c) Spring balance: Measure: Measures force or weight.

Principle: It works on Hooke's law, which states that the force required to extend or compress a spring is directly proportional to the displacement of the spring from its equilibrium position.

Chapter 9 : Friction

1. (a) (ii) (b) (iv) (c) (i) (d) (ii) (e) (iii)

2. (a) opposite (b) microscopic irregularities (c) stationary

3. (a) (v) (b) (ii) (c) (i) (d) (iii) (e) (iv)

4. (a) False (b) True (c) False

5. (a) Friction : Friction is the force that opposes the relative motion or tendency of such motion of two surfaces in contact. It is a contact force.

(b) Soap solution and ring in the finger : The soap solution acts as a lubricant, reducing friction and making it easier to remove the ring from the finger.

(c) Baller rubbing hands with dust or on the ground : It helps to increase the grip by adding some roughness to the hands, increasing friction between the ball and the hands.

6. (a) Examples where friction is a boon : Walking without slipping, writing with a pen, driving a car.

(b) Examples where friction is an evil : Wear and tear of machinery, difficulty in sliding heavy objects, overheating of machine parts.

(c) Why is a boat always made streamlined : To reduce fluid friction (water resistance) and move through water more efficiently.

(d) Effect of surface area on friction : Generally, an increase in surface area increases friction. More contact between surfaces leads to higher friction.

7. (a) **Friction**

Definition: The force that resists the relative motion (motion of one body over another) is called friction.

Causes of friction: Magnified view of surface shows that every surface has some irregularities on its base.

If irregularities of one surface get fitted into the irregularities of the other surface, it is called interlocking of irregularities.

Types of Friction

(i) Static friction : Static friction is the friction between two non-moving surfaces or it is the friction between two resting surface in contact.

(ii) Sliding friction : The friction between two sliding surfaces in contact is called sliding friction.

(iii) Rolling friction : When an object rolls over a surface then the irregularities between the two interlock.

(iv) Fluid friction : Fluids include air and water. The medium that can flow is called fluid.

(b) Methods opted to reduce friction

Friction is the directly proportion to the roughness of surface. So, the only way to reduce friction is to make the surface smooth. Methods adopted for smoothing of surface include:

(i) Polishing : Polishing of a surface smoothens it. For examples jewels of watches are polished so as to hold axles between them.

(ii) Lubrication : Lubrication also reduces friction. By applicaton of a lubricant friction between two surfaces is reduced because then the surfaces of the two objects do not rub against each other instead lubricated surfaces rub against each other instead lubricated surfaces rub against each other which have much less friction as compared to original rough surfaces.

(iii) Ball and Bearings : As we have already discussed that rolling friction is less than sliding friction so usage of ball and bearings can reduce the friction by replacement of sliding friction by rolling one.

(iv) By use of layer of air or avoiding direct contact : As seen in the case of hovercraft introduction of layer of air between hull and the water reduces the friction between two.

(v) By streamlining of moving : Nature has given birds and fishes streamlined bodies.

(c) (i) Rolling friction: Resistance to the motion of a rolling object.

(ii) Fluid friction: Resistance to an object moving through a fluid (liquid or gas).

(iii) Sliding friction: Resistance to the motion of an object sliding over a surface.

(iv) Static friction: Force preventing the initiation of motion between surfaces.

(d) Importance of friction and examples:

Importance: Provides grip, helps in walking, enables writing, essential for the functioning of brakes in vehicles.

Examples of increased friction: Car tires on a wet road, cleats in sports shoes, sanding a surface before painting.

Chapter 10 : Sound

1. (a) (iv) (b) (ii) (c) (i) (d) (iv)

2. (a) Vibrating objects (b) Phonation (c) the eardrum

3. (a) (iv) (b) (i) (c) (iii) (d) (ii) (e) (v)

4. (a) True (b) True (c) False

5. (a) Amplitude : The maximum displacement of a particle from its equilibrium position in a wave.

(b) Frequency : The number of oscillations or cycles of a wave per unit of time, usually measured in Hertz (Hz).

(c) Time period : The time taken to complete one oscillation or one cycle of a wave.

(d) Oscillation : The repetitive back-and-forth motion around a central point or equilibrium position.

(e) Infrasonics vs. Ultrasonics:

Infrasonics: Frequencies below the audible range (below 20 Hz).

Ultrasonics: Frequencies above the audible range (above 20,000 Hz).

6. (a) Sound : Vibrations that travel through a medium, usually air, and can be heard when they reach the ear.

(b) Audible and inaudible sounds:

Audible sounds: Sounds that can be heard by the human ear (20 Hz to 20,000 Hz).

Inaudible sounds: Sounds outside the audible range (either infrasonic or ultrasonic).

(c) Usefulness of echos : Echos help in determining distances and the presence of objects by reflecting sound waves.

(d) Quality of sound : The characteristic that allows us to distinguish between sounds of the same pitch and loudness from different

sources.

7. (a) **Definition :** Sound is a kind of sensation perceived by our brain and received or detected by our ears. The unit of sound measurement is decibel (dB).

Vibrating instruments produce sound

Vibration is a mechanical phenomenon whereby oscillations occur about a central position.

For example, movement of a tuning fork, strings of violin, gong of electric bell, etc.

Almost all musical instruments produce sound due to their vibrations.

Medium for Sound Propagation

(a) Sound propagation through air

(b) Sound propagation through liquid

(c) Sound Propagation through solids

(d) Sound propagation through vaccum

(b) Human beings produce sound with the help of larynx or Adam's apple or voice box.

Voice box is present in the anterior neck and remains connected at one end to the pharynx and at the other end to the trachea or wind pipe.

Larynx can manipulate the pitch and volume of sound produced.

Phonation : The process of sound production by quasi-periodic vibrations of the vocal cord or larynx or voice box is called as phonation.

Larynx box consists of two vocal cord tissues. When we speak, the vocal cord tissues are pulled and thus a gap is created between them. As a result of this air passes through the space created into a windpipe. When air passes through the gap in between vocal cord tissues, it causes them to vibrate and vibrating vocal cords produce sound.

(c) Heavier sound is the louder one.

Loudness = $(\text{Amplitude of vibration})^2$

That means, larger the amplitude, heavier the sound will be.

Smaller the amplitude, softer and gentle the sound will be. Loudness is proportional to the square of the amplitude. This mean that if the amplitude is doubled, the loudness increases by four times.

Heavier sound can be heard over longer distance.

Shrill voice is a pitched sound. It depends on frequency of vibrations and does not depend on amplitude of vibrations.

High pitch sound is produced by high frequency sound and low pitch or shallow voice is produced by low frequency sound.

(d) The quality of sound is determined by the frequencies present in it and their relative loudness.
When a wire is struck in guitar it produces a basic sound of certain frequency called the fundamental. While the mixture of sounds of other frequencies and varying loudness produced simultaneously is called harmonics.

Chapter 11 : Chemical Effects of Electric Current

1. (a) (i) (b) (iii) (c) (i)

2. (a) the process of using an electric current to non sponteneous reaction (b) Electroplating (c) a poor (d) heat, light, magnetic

3. (a) (iv) (b) (ii) (c) (v) (d) (i) (e) (iii)

4. (a) True (b) False

5. (a) Electrolysis : The process of using an electric current to drive a non-spontaneous chemical reaction, typically to produce a chemical change or deposit metal on an electrode.

(b) Conducting power of a conductor : The ability of a material to allow the flow of electric current through it.

6. (a) Electrolysis in metal refining : Electrolysis can help in refining a metal by using it to extract the metal from its ore or to purify it. For example, electrolysis is used in the refining of copper.

(b) Relationship between heating and electric current : Electric current can produce heating effects, as seen in appliances like electric heaters and stovetops. The relationship is explained by Joule's law, which states that the heat produced is directly proportional to the square of the current and the resistance in the circuit.

7. (a) Electroplating is the process of planting one metal onto another by hydrolysis, most commonly for decorative purposes or to prevent corrosion of a metal. There are also specific types of electroplating such as copper planting, silver planting, and chromium planting.

The purposes of Electroplating:

1. Appearance
2. Protected
3. Special surface properties
4. Engineering or mechanical properties

(b) Bulb glow in pure water : The bulb does not glow strongly when

the wires are dipped in 90% pure water because pure water is a poor conductor of electricity. It contains very few ions necessary for the flow of electric current. To make water a better conductor, ions are typically added, such as in the case of electrolytes or impurities in water.

Chapter 12 : Some Natural Phenomena

1. (a) (ii) (b) (i) (c) (i) (d) (i) (e) (ii) (f) (i)

2. (a) Magnitude (b) Tsunami (c) Charles F. Richter (d) 1556 in China (e) Electroscope

3. (a) (ii) (b) (iii) (c) (i) (d) (vi) (e) (v) (f) (iv)

4. (a) True (b) False (c) True

5. (a) Seismic zone : An area on Earth's surface known for seismic activity and earthquake occurrences.

(b) Earthquake : The shaking of the ground caused by the sudden release of energy in the Earth's crust.

(c) Magnitude of the earthquake : A measure of the energy released by an earthquake, quantified using scales like Richter scale or Moment Magnitude scale.

(d) Squat position : A safety position adopted during an earthquake where a person crouches low to the ground to avoid falling.

(e) The deadliest lightning strike occurred on November 2, 1994 in Dronka, Egypt. Killing 469 people when a lightning bolt ignited fuel tanks.

(f) The most earthquake-prone states in India are Jammu & Kashmir Himachal Pradesh, Uttarakhand, Arunachal Pradesh, Sikkim, Assam, Nagaland, Manipur, Mizoram and Meghalaya. These states are in Seismic zones VI and V, where the Indian Plate meets the Eurasian Plate, causing frequent earthquakes. Active fault lines and subduction zones in these areas also increase earthquakes risk.

6. (a) Seismology :

The scientific study of earthquakes and the propagation of elastic waves through the Earth.

(b) Four layers of Earth : Crust, mantle, outer core, inner core.

(c) Seismic zones in India : Zones based on earthquake susceptibility: Zone I to Zone V.

(d) Metal conductors on buildings : Installed to divert lightning strikes

away from the structure and prevent damage.

9. (a) Earthquake and related terms :

Epicenter : The point on Earth's surface directly above the earthquake's point of origin.

Hypocenter (Focus): The actual point of origin within the Earth.

Seismic waves: The energy waves that travel through the Earth.

(b) Cause behind earthquakes : Most earthquakes result from the movement of tectonic plates along faults in the Earth's crust.

(c) Richter scale : A logarithmic scale measuring the amplitude of seismic waves; each unit increase represents a tenfold increase in amplitude.

(d) Precautions in earthquake-prone regions : Secure heavy furniture, have an emergency kit, know evacuation routes, and practice earthquake drills.

(e) Lightning occurrence : Lightning occurs due to the discharge of electrical energy in the atmosphere, often during thunderstorms, when the electrical potential difference between clouds and the ground is high.

Chapter 13 : Light

1. (a) (i) (b) (iii) (c) (ii)

2. (a) about 1/16th (b) Accommodation (c) Echo (d) the reversal of left and right

3. (a) (iii) (b) (iv) (c) (i) (d) (ii) (e) (v)

4. (a) True (b) True (c) False (d) False

5. (a) Myopia : A vision condition where close objects are seen clearly, but distant objects appear blurry (nearsightedness).

(b) What enables us to see : The eye, as it receives and processes visual information.

6. (a) Two laws of reflection:

Law 1 : The incident ray, reflected ray, and the normal at the point of incidence all lie in the same plane.

Law 2 : The angle of incidence is equal to the angle of reflection.

(b) Common application of multiple reflections:

Kaleidoscope: The use of multiple reflections to create colourful patterns.

7. 1. Kaleidoscope was invented in 1817 by Scottish inventor Sir David Brewster. The word kaleidoscope is derived from the German phrase meaning “to see the beautiful”.

It is a long cylindrical tube with mirrors containing loose coloured objects such as beads, pebbles, bits of coloured glasses, etc. A Kaleidoscope operates on the principle of multiple reflection, where several mirrors are placed at an angle to one another,

usually 60°. The 60° angle creates several duplicate images of the objects, five at 60. As the tube is rotated, the tumbling of the coloured objects presents varying colours and patterns. Arbitrary patterns show up as a beautiful symmetrical pattern created by the reflections.

2. Human eye:

Structure: The human eye has various components, including the cornea, lens, retina, iris, and optic nerve.

Function: Light entering the eye is refracted by the cornea and lens, forming an inverted image on the retina. The retina contains photoreceptor cells (rods and cones) that convert light into electrical signals sent to the brain via the optic nerve.

Labelled diagram: Unfortunately, I cannot draw diagrams, but you can easily find a labeled diagram of the human eye in biology textbooks or online resources.