SCIENCE-8

Chapter 1: Crop Production and Management

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

B. 1. F 2. F 3. F 4. T 5. T

C. 1. (b) 2. (a) 3. (e) 4. (d) 5. (c)

D. 1. Kharif crops: rice, maize

Rabi crops: wheat, barley

2. Irrigation is the supply of water to crops at regular intervals to ensure the healthy growth of plants. Two water-saving methods of irrigation are drip irrigation and sprinkler irrigation.
3. Seeds should be sown at the right depth, not too deep or too shallow, and at a proper distance from each other to avoid overcrowding.
4. Transplantation is the process where seedlings are grown initially in a nursery and then moved to the main field. Advantages include better survival rates of seedlings, proper spacing, and selection of healthy plants for growth.
5. Weeds are unwanted plants that grow alongside crops, competing for nutrients, water, light, and space. Weeds can be controlled through manual removal, use of weedicides, and preventive measures like proper soil preparation and using clean seeds.

E. 1. Ploughing and levelling are done to prepare the soil for planting. Ploughing helps in loosening and aerating the soil which makes the root penetration easier and allows for better water absorption. Levelling ensures the even distribution of water across the field, preventing soil erosion and ensuring uniform growth of crops.

2. Manure is an organic substance derived from decomposed plant or animal waste that enriches the soil with nutrients and improves its texture. Fertilisers are chemical substances manufactured industrially that supply specific nutrients directly to the soil. Manure is generally less concentrated in nutrients compared to fertilisers and also helps in enhancing the soil's moisture retention capacity.
3. Seeds can be sown using various methods depending on the crop and local agricultural practices. Common methods include broadcasting by hand, using a seed drill that places seeds at the correct depth and spacing, and transplantation where seedlings are first raised in a nursery and then transferred to the field. Each method has its benefits, and the choice depends on the seed size, soil type, and available technology.
4. Soil preparation for sowing involves several steps such as ploughing to loosen the soil, levelling to smooth the surface, and sometimes applying manure or fertilisers to enrich the soil. The soil may also be watered before sowing to ensure it has adequate moisture. These steps help in creating optimal soil conditions for seed germination and root growth.
5. Farmers employ several strategies to protect crops from weeds, including manual removal, using weedicides, and mulching to inhibit weed growth. Crop rotation and selecting weed-resistant crop varieties are other effective methods. Regular monitoring and early intervention help to keep weed populations under control, ensuring that crops can grow without competing for nutrients and sunlight.

Chapter 2: Microorganisms

A. 1. (b) 2. (b) 3. (c) 4. (a) 5. (d)

B. 1. microscope 2. Yeast 3. Blue-green 4. Vibrio cholerae 5. viruses
6. fermentation

C. 1. F 2. T 3. T 4. False 5. True

D. 1. The major groups of microorganisms include bacteria, fungi, protozoa, and algae. Viruses are also sometimes classified as microorganisms though they are acellular.

2. Microorganisms can cause diseases in humans, animals, and plants such as tuberculosis, malaria, and plant rusts. They can also lead to food spoilage and poisoning which affect health and cause economic losses.

3. Antibiotics are chemicals produced by microorganisms or synthesized artificially to kill or inhibit the growth of other harmful microorganisms. They are widely used to treat bacterial infections.

4. Blue-green algae are capable of fixing atmospheric nitrogen into forms usable by plants. This enriches the soil with nitrogen, thus enhancing its fertility and reducing the need for chemical nitrogen fertilizers.

5. Food poisoning is typically caused by consuming food contaminated with pathogens such as bacteria (e.g., Salmonella, E. coli), viruses (e.g., norovirus), or toxins produced by microorganisms. Poor hygiene, improper handling, and inadequate cooking or storage can contribute to food contamination.

E. 1. Microorganisms are incredibly useful in various aspects of human life and the environment. They play a crucial role in the decomposition of organic matter, which helps in recycling nutrients in ecosystems. In agriculture, certain bacteria and blue-green algae are vital as they fix atmospheric nitrogen into forms that plants can use, enhancing soil fertility. In the food industry, microorganisms are essential for the production of a wide range of products like yogurt, cheese, and alcoholic beverages, where they help in fermentation. Microorganisms like yeast convert sugars into alcohol and carbon dioxide, which is fundamental in brewing and baking. Additionally, microorganisms are used in the production of antibiotics, which are crucial for treating bacterial infections. They also play a role in biotechnology and genetic engineering, where they are used to produce enzymes, vitamins, and hormones. Moreover, microbes are used in bioremediation to clean up pollutants from the environment, making them invaluable in environmental sustainability.

2. A vaccine works by mimicking a natural infection, thereby stimulating the body's immune system to develop a memory against a specific disease without causing the illness. Vaccines contain weakened or killed forms of pathogens, or parts of the pathogen like proteins or sugars, which are recognized as foreign by the body's immune system. When introduced, the immune system mounts an immune response by producing antibodies specific to the antigens present in the vaccine. This process also involves the activation of T-cells. The key to vaccination is the immune memory; after the initial exposure via the vaccine, the immune system remembers the specific antigens. If the vaccinated individual later encounters the actual pathogen, the immune system can quickly recognize and combat the pathogen more efficiently and rapidly, thus preventing the disease from developing or significantly reducing its severity.

3. To prepare curd at home, start with fresh, warm milk; the temperature of the milk should ideally be around 45°C. Add a small amount of curd from a previous batch, which acts as an inoculum. This curd contains live cultures of the bacterium Lactobacillus, which is essential for the fermentation process. Typically, a teaspoon of curd is sufficient for a liter of milk. Mix the curd thoroughly with the milk to ensure that the bacteria are evenly distributed. Cover the mixture and keep it in a warm place undisturbed for about 6 to 8 hours. The Lactobacillus bacteria ferment the lactose sugar present in the milk into lactic acid, which acts on milk protein to give curd its texture and tangy flavor. The exact time

for curd to set might vary depending on the ambient temperature; warmer climates facilitate faster fermentation.

4. Food preservation involves treating and handling food to stop or slow down food spoilage, loss of quality, edibility, or nutritional value and thus allow for longer food storage. Preservation usually involves preventing the growth of bacteria, fungi, and other microorganisms, as well as retarding the oxidation of fats which cause rancidity. Here are four common methods:

   Refrigeration and Freezing: Slowing down the growth of microorganisms and enzyme activity that cause food spoilage. Freezing renders bacteria, yeasts, and molds inactive.

   Canning: Food is heated to a temperature that destroys microorganisms and then sealed in airtight containers. This process also reduces the oxygen inside the container, further inhibiting spoilage.

   Drying or Dehydration: Removing moisture from food, which inhibits the growth of microorganisms. Sun drying, air drying, or using dehydrators are common methods.

   Salting: Adding salt to food draws out moisture by osmosis, creating an environment inhospitable to microbial growth. This method is commonly used for preserving meats and fish.

5. The level of nitrogen in the atmosphere is maintained through the nitrogen cycle, an ecological system where nitrogen is converted into multiple chemical forms as it circulates among the atmosphere, terrestrial, and marine ecosystems. Key processes include nitrogen fixation, nitrification, assimilation, ammonification, and denitrification. Nitrogen fixation is carried out by certain bacteria and blue-green algae that convert atmospheric nitrogen into organic compounds that plants can absorb as nutrients. Animals obtain nitrogen by consuming plants. After the organic matter is decomposed, ammonification converts organic nitrogen back into ammonia. Nitrification by bacteria then converts ammonia into nitrates, which are useful to plants. Denitrification returns nitrogen to the atmosphere by converting nitrates back to nitrogen gas, thus completing the cycle and maintaining the atmospheric nitrogen balance.

Chapter 3: Coal and Petroleum

A. 1. (c) 2. (a) 3. (a) 4. (a)

B. 1. T 2. F 3. F 4. T 5. F

C. 1. Carbonisation is the process where plant material is converted into carbon or carbon-containing substances under high pressure and lack of air over millions of years. This is typically how fossil fuels such as coal are formed.

2. **Exhaustible:** Coal, Petroleum

   Inexhaustible: Solar energy, Wind energy

3. The different varieties of coal, classified based on their carbon content and the heat they can produce, are:

   Peat (least carbon content) Lignite

   Bituminous Anthracite (highest carbon content)

4. Coal gas is a type of gas that is produced by the distillation of coal and is used as fuel. Its main constituents include methane, hydrogen, and carbon monoxide, all of which are combustible gases. It may also contain small amounts of other gases such as carbon dioxide and nitrogen.

5. Two constituents of petroleum that are typically not used as fuels are:

   Paraffin wax: Used in candles, coating, and sealing

   Petroleum coke: Used in the manufacture of electrodes and as a carbon additive in industrial processes

E. 1. Coal is formed from the remains of vegetation primarily consisting of plant materials. Over millions of years, these materials get buried under sand and clay and are subjected to high temperature and pressure. This process, known as carbonization, transforms the plant material into coal. Throughout this period, the chemical composition and the physical properties of the plant material change drastically, resulting in the formation of coal.

2. Harmful effects of burning fuels include air pollution, which leads to respiratory health issues and contributes to global warming through the release of greenhouse gases like carbon dioxide. To save petrol for future generations, we can adopt more fuel-efficient driving habits, use public transportation, carpool, and invest in vehicles that use alternative fuels or are more fuel-efficient.

3. LPG (Liquefied Petroleum Gas) and CNG (Compressed Natural Gas) are considered cleaner alternatives to traditional fossil fuels. They burn more cleanly than petrol or diesel, producing fewer harmful emissions and reducing the release of particulate matter and NOx gases. These fuels are also more cost-effective in the long run and decrease the dependency on oil reserves, thus contributing to energy security.

4. Petroleum is formed from the remains of tiny sea plants and animals that died millions of years ago. After these organisms died, their bodies settled at the sea bottom and got covered by layers of silt and sand. Over time, the absence of air, high temperatures, and increasing pressure transformed these remains into petroleum and natural gas. This transformation process, which involves the breakdown of complex organic molecules into simpler hydrocarbons, occurs over geological timescales.

5. Excessive use of fossil fuels leads to several severe environmental and health issues. It increases air pollution levels, contributing to respiratory diseases, heart conditions, and other health problems. Environmentally, burning fossil fuels is a major source of greenhouse gas emissions, which are primarily responsible for global warming and climate change. This, in turn, leads to extreme weather conditions, rising sea levels, and disruption of ecosystems. Additionally, overreliance on fossil fuels depletes these non-renewable resources, making future generations vulnerable to energy shortages.

Chapter 4: Combustion and Flame

A. 1. (c) 2. (a) 3. (a) 4. (a) 5. (c)

B. 1. T 2. F 3. F 4. F 5. T

C. 1. (f) 2. (d) 3. (c) 4. (e) 5. (b)
6. (c)

D. 1. Kerosene will catch fire first because it has a lower ignition temperature compared to coal. Kerosene, being a liquid fuel, vaporizes quickly and ignites more readily, whereas coal, being a solid, takes more time to reach its ignition temperature.

2. Presence of a combustible substance.

   Adequate supply of oxygen or another oxidizer.

   Reaching or exceeding the ignition temperature of the combustible material.

3. An explosion is a rapid increase in volume and release of energy in an extreme manner, usually with the generation of high temperatures and the release of gases. This occurs in a way that creates a shockwave and is generally accompanied by the rapid burning or decomposition of a substance, such as in the case of an explosive material.

4. Water should not be used for extinguishing electrical fires because water conducts electricity. Using water on an electrical fire can lead to a risk of electrocution and may also spread the fire if the electrical current causes the water to break into hydrogen and oxygen.

5. **Combustible substances:** These are materials that can ignite and burn in air. Examples include wood and paper.

   Non-combustible substances: These materials do not burn and cannot be ignited. Examples include cement and sand.

E. 1. Carbon dioxide controls fire by smothering it. Being heavier than air, CO2 blankets the fire, displacing oxygen from around the flames. Since oxygen is essential for combustion, its absence suffocates the fire, effectively extinguishing it. CO2 does not support combustion and thus halts the fire from continuing to burn.

2. An ideal fuel is economical, readily available, and easy to transport. It burns easily in air at a moderate rate and releases a large amount of energy. It should also have a high calorific value and burn without releasing harmful by-products, thus causing minimal pollution. Furthermore, it should be safe to handle, store, and use under a wide range of conditions.

3. Draw diagram yourself.

   A candle flame can be divided into three distinct zones:

   Innermost zone: Dark, composed mainly of unburnt wax vapors, coolest part of the flame.

   Middle zone: Yellow, bright luminous layer where partial combustion of wax vapors occurs producing light.

   Outer zone: Non-luminous, blue, where complete combustion takes place, and it's the hottest part.

   Unfortunately, I'm unable to draw or directly display images. For visualization, imagine a typical candle flame with these zones clearly marked.

4. **Air pollution:** Burning fuels releases harmful pollutants like carbon monoxide, sulphur dioxide, and nitrogen oxides, which contribute to air pollution and smog.

   Global warming: Combustion of fossil fuels releases large amounts of carbon dioxide, a greenhouse gas that contributes to global warming and climate change.

   Health risks: Exposure to fumes and chemicals from burning fuels can lead to respiratory problems, heart disease, and other health issues.

5. It is possible to boil water in a paper cup without burning the paper because the heat from the fire is absorbed by the water inside the cup. Water has a high specific heat capacity, so it absorbs and distributes the heat quickly enough to prevent the paper cup from reaching its ignition temperature, thus preventing the paper from catching fire.

Chapter 5: Conservation of Plants and Animals

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

B. 1. F 2. F 3. T 4. T 5. T
6. T

C. 1. planet 2. biosphere 3. flora 4. 500 5. 100

D. 1. Conserving biodiversity is essential for maintaining ecosystem stability and resilience, providing ecological services like clean water, air, and fertile soil, and preserving the genetic diversity necessary for food security, medicine, and adapting to changing environmental conditions.

2. Flora refers to the plant life present in a particular region or time, typically the naturally occurring or

indigenous plants. Fauna, on the other hand, refers to the animal life of any particular region or era. Flora and fauna together make up the biotic component of an ecosystem.

3. Activities typically not permitted in wildlife sanctuaries include hunting, poaching, logging, and any other activities that could disrupt or harm the wildlife and their natural habitat.
4. Two major causes of deforestation are agriculture (clearing land for crops and livestock) and logging (for timber and other wood products). Urbanization, mining, and infrastructure development also contribute to deforestation.
5. Under the Wildlife Protection Act of 1972, India has established various types of protected areas including National Parks, Wildlife Sanctuaries, Conservation Reserves, and Community Reserves.

E. 1. Deforestation leads to reduced rainfall by disrupting the local and regional water cycles. Trees play a crucial role in the water cycle by absorbing groundwater through their roots and releasing water vapor into the atmosphere through transpiration. This moisture contributes to cloud formation. When forests are cut down, there is less transpiration, leading to decreased cloud formation and, consequently, reduced precipitation. Additionally, forests help to maintain the temperature and humidity levels conducive to rainfall. Without them, the local climate can become drier, further reducing rainfall.

2. Conserving forests and wildlife is essential for maintaining biodiversity, which is vital for ecological stability and resilience. Forests provide habitat to countless species and help maintain ecological processes like pollination, seed dispersal, and nutrient cycling. They also play a significant role in mitigating climate change by absorbing carbon dioxide from the atmosphere. Preserving wildlife and forests ensures ecological balance, supports livelihoods, preserves cultural heritage, and allows for scientific research and recreational opportunities, all of which are crucial for sustainable development and human well-being.
3. Deforestation causes desertification by removing the vegetation cover that stabilizes the soil. Trees and plants prevent soil erosion by wind and water through their root systems that hold the soil in place. When these plants are removed, the soil becomes loose and is easily carried away by wind or washed away by rainwater, leading to land degradation. The loss of soil fertility and the reduction in soil moisture make the land barren and more desert-like. Over time, this can transform what was once fertile land into a desert, a process known as desertification.
4. Saving paper is crucial for conserving resources and reducing environmental impact. Paper production involves cutting down trees, which affects deforestation and habitat destruction. It also requires water and energy, contributing to resource depletion and pollution. Here are ways to save paper:

   Use digital documents instead of printing whenever possible.

   Print on both sides of the paper to reduce the amount of paper used.

   Reuse scrap paper for notes before recycling it.

   Subscribe to digital versions of newspapers and magazines.

   Use cloth napkins instead of paper ones.

   Opt for online billing and correspondence to reduce paper mail.

   Properly recycle paper to ensure it is reused in manufacturing new paper products.
5. A wildlife sanctuary is a protected area established for the conservation of animals and their natural habitats. It aims to protect wildlife from hunting, predation, or competition, and provides support for endangered species to recover and thrive. Activities like hunting and logging are generally restricted. Here are three wildlife sanctaries:

   Kaziranga National Park, Assam: Known for its population of Indian rhinoceros.

   Sariska Wildlife Sanctuary, Rajasthan: Known for its tiger population, part of India's Project Tiger.

   Periyar Wildlife Sanctuary, Kerala: Noted for its elephant populations and picturesque landscapes.

Chapter 6: Reproduction in Animals

A. 1. (a) 2. (c) 3. (d) 4. (d) 5. (a)

B. 1. F 2. T 3. F 4. F 5. T

C. 1. (e) 2. (d) 3. (b) 4. (a) 5. (c)

D. 1. Reproduction is necessary for the continuation of a species, allowing organisms to pass on genetic information to the next generation. It ensures the survival of species on Earth by contributing to genetic diversity and adaptation through evolutionary processes.

2. Sexual reproduction involves two parents and the fusion of male and female gametes, leading to offspring that have genetic material from both parents. This results in genetic variation. Asexual reproduction involves only one parent and no fusion of gametes, producing offspring genetically identical to the parent, which limits genetic diversity.

3. Metamorphosis is the biological process through which an animal physically develops after birth or hatching, involving a conspicuous and relatively abrupt change in the animal's body structure through cell growth and differentiation. Common examples include frogs from tadpoles and butterflies from caterpillars.

4. Oviparous animals are those that lay eggs, with embryos developing and receiving nourishment from the yolk. Examples include hens, lizards, and fish.

5. **Male reproductive organs:** Testes, vas deferens, urethra, penis, seminal vesicles, prostate gland.

   Female reproductive organs: Ovaries, fallopian tubes, uterus, cervix, vagina.

E. 1. Draw diagram yourself.

   Amoeba: Amoeba reproduces asexually through a process called binary fission. When an amoeba reaches its maturity, the nucleus elongates and divides into two by mitosis. Following this, the cytoplasm divides, encircling each nucleus, which results in the formation of two identical amoebic cells. This process is efficient and quick, allowing rapid population growth.

   Hydra: Hydra reproduces both sexually and asexually. The common asexual reproduction method in hydra is budding. In this process, a small bud develops as an outgrowth on the body of the hydra. This bud develops a mouth and tentacles, and eventually detaches from the parent body to become an independent organism. Hydra can also reproduce sexually where gametes are produced, but this typically occurs under different environmental conditions.

2. Draw diagram yourself.

   In humans, fertilization is the process where the sperm cell from the male merges with the egg cell from the female. This process begins with the release of an egg from the female's ovary (ovulation), which then enters the fallopian tube. Sperm deposited in the female reproductive tract during intercourse travel through the cervix and uterus to reach the fallopian tube. Fertilization usually occurs in the fallopian tube. When a sperm successfully penetrates the egg, their nuclei fuse to form a zygote, a single cell with genetic material from both parents. This zygote will begin to divide and develop into an embryo.

3. A zygote is the initial cell formed when two gamete cells are joined by means of sexual reproduction. A zygote is a single cell, with a full set of genetic material (DNA) – half from each parent.

   A fetus refers to the later stages of development during the gestation period, particularly after the embryonic stage, or from the ninth week of pregnancy until birth.

Differences:

Development Stage: The zygote is the earliest stage, just a single cell. A fetus, on the other hand, is a significantly more developed stage, where the major organs have formed and continue to mature.

Physical Appearance: A zygote does not resemble a human structure and is microscopic. A fetus, however, has a distinct human appearance with limbs and facial features developing clearly.

4. **External Fertilization:**

   Takes place outside the female's body.

   Common in many aquatic organisms, such as fish and amphibians, where females lay eggs in the water and males fertilize them externally.

   This method often results in a large number of gametes being released to ensure successful fertilization due to the lack of control over external conditions.

   Internal Fertilization:

   Occurs inside the female's body.

   Common in terrestrial animals, including most mammals, birds, and some reptiles.

   Offers a greater protection of the developing embryo from predators and environmental fluctuations, and generally results in fewer but more developed offspring.

Chapter 7: Reaching the Age of Adolescence

A.	1.	(c)	2.	(d)	3.	(b)	4.	(a)	5. (c)
B.	1.	(c)	2.	(e)	3.	(a)	4.	(d)	5. (b)
C.	1.	adolescence	2.	less	3.	physical	4.	hormones	5. nucleus

D. 1. Adolescence is the transitional stage of development between childhood and adulthood that involves physical, psychological, and social changes. This period typically occurs between ages 10 and 19 and is marked by rapid growth, hormonal changes, and the maturation of sexual characteristics.

2. Height increases during puberty due to the hormonal changes that stimulate growth. The increase in growth hormone and sex hormones like testosterone and estrogen lead to the growth spurt that is characteristic of this developmental phase.

3. Adolescents often get pimples due to hormonal changes that stimulate the sebaceous glands in the skin to produce more sebum. This excess oil can clog pores and, along with bacteria and dead skin cells, lead to acne.

4. Menarche is the onset of menstruation, the first menstrual cycle, and generally occurs during early adolescence, marking the beginning of a female's reproductive years. Menopause is the cessation of menstruation, typically occurring between ages 45 and 55, marking the end of reproductive years.

5. A zygote with XX chromosomes will develop into a female child, while a zygote with XY chromosomes will develop into a male child.

E. 1. During puberty, several physical and hormonal changes occur in both males and females, preparing their bodies for reproductive capabilities. Here are some key changes:

   Growth Spurt: Rapid increase in height and weight.

   Development of Secondary Sexual Characteristics: In males, this includes the growth of facial, pubic, and body hair, deepening of the voice, and development of larger Adam's apple. In females, there is the growth of breasts, pubic hair, and widening of hips.

   Reproductive Organs Mature: In males, the testes and penis grow larger. In females, the ovaries begin releasing eggs and menstrual cycles start, marking the capability for reproduction.

Increased Oil and Sweat Gland Activity: This can lead to common skin problems, such as acne.

Emotional and Cognitive Changes: Increased independence, development of personal identity, and emotional fluctuations are also common.

2. **Pituitary Gland:** Often termed the "master gland" because it regulates other endocrine glands; secretes growth hormone, prolactin, oxytocin, and more.

   Thyroid Gland: Produces thyroxine (T4) and triiodothyronine (T3), which regulate metabolism.

   Pancreas: Produces insulin and glucagon, which regulate blood sugar levels.

   Adrenal Glands: Produce cortisol, which regulates metabolism and stress response, and adrenaline, which increases the body's ability to respond to stress.

   Ovaries (in females): Secrete estrogen and progesterone, which regulate menstrual cycles and play roles in pregnancy.

   Testes (in males): Produce testosterone, which is responsible for the development of male secondary sexual characteristics and reproduction.

3. Maintaining good reproductive health involves both physical and behavioral health practices:

   Personal Hygiene: Regular bathing and cleaning of genital areas to prevent infections.

   Balanced Diet: Ensuring a diet rich in nutrients supports hormonal balance and reproductive health.

   Regular Exercise: Helps maintain a healthy body weight and reduce stress, which can positively impact reproductive health.

   Safe Sexual Practices: Using contraceptives to prevent sexually transmitted diseases and unwanted pregnancies.

   Regular Medical Check-ups: Including screenings for reproductive health disorders.

   Avoiding Harmful Substances: Limiting alcohol intake, avoiding smoking and illicit drugs, which can adversely affect fertility and general health.

4. The menstrual cycle is a series of natural changes in hormone production and the structures of the uterus and ovaries in the female reproductive system that make pregnancy possible. The cycle is required for the production of oocytes, and for the preparation of the uterus for pregnancy. Key phases include:

   Menstruation: Shedding of the uterine lining.

   Follicular Phase: Several follicles in the ovaries grow and form a mature egg.

   Ovulation: The release of a mature egg from the surface of the ovary.

   Luteal Phase: The follicle turns into the corpus luteum, which secretes progesterone to prepare the uterus for pregnancy.

   If fertilization doesn't occur, levels of estrogen and progesterone decrease, leading to the shedding of the uterine lining.

5. **Adam's Apple:** Visible as a prominent bulge in the neck, it is more prominent in males and is part of the larynx. It grows during puberty and is associated with the deepening of the voice due to the growth of the larynx and vocal cords.

   Sex Determination: In humans, sex is determined by the X and Y chromosomes. Females have two X chromosomes (XX), and males have one X and one Y chromosome (XY). The presence of the Y chromosome determines maleness by triggering the development of testes, which produce male sex hormones and lead to the development of male secondary sexual characteristics during puberty.

Chapter 8: Force and Pressure

A. 1. (c) 2. (a) 3. (c) 4. (b) 5. (d)

B. 1. F 2. T 3. F 4. T 5. T
6. T

C. 1. (e) 2. (a) 3. (d) 4. (b) 5. (c)

D. 1. **Gravitational force:** Acts between all masses in the universe.

Electrostatic force: Acts between charged particles.

Magnetic force: Acts between magnetic poles.

2. **Compressing a spring:** Applying force compresses the spring, altering its length.

Molding clay: Applying pressure can change the shape of clay into various forms.

3. It indicates that the forces are balanced; each team is exerting equal force in opposite directions, resulting in no change in motion of the rope (zero resultant force).

4. (a) Muscular force when lifting a bucket.

(b) Gravitational force acts on an apple falling to the ground.

(c) Muscular force when squeezing a lemon.

5. Liquid pressure increases with depth. The deeper you go into a liquid, the greater the pressure exerted by the weight of the liquid above, increasing with the depth because of the increasing weight of the liquid exerting force in a downward direction.

E. 1. **Change in state of motion:** Force can make an object move from rest, stop moving, or change its velocity.

Change in shape or size: Force can deform an object, either permanently or temporarily.

Direction: Force can change the direction in which an object is moving.

Induce stress: Force can cause an object to experience internal stress, potentially leading to strain or breaking.

2. Pascal's Law states that when pressure is applied to a confined fluid, the pressure change is transmitted undiminished throughout the fluid.

Experiment to demonstrate Pascal's Law: Take a balloon and fill it with water. Now, gently squeeze the balloon at different points. You will notice that the balloon deforms not just where it is being squeezed but throughout its surface. This is because the pressure applied at any point of the balloon is transmitted throughout the water inside, demonstrating that the fluid (water) transmits pressure equally in all directions.

3. Atmospheric pressure is the force per unit area exerted on a surface by the weight of the air above that surface in the atmosphere of Earth. It decreases with altitude.

Why we don't feel it: Despite the enormity of atmospheric pressure, we generally don't feel it because the human body is adapted to the pressure. Additionally, the pressure inside the body is equal to the pressure outside, allowing the body to be in balance with the external pressure. This balance means there is no net force pushing on us, which is why we do not feel the atmospheric pressure.

4. (a) Needle pierces a piece of cloth easily: A needle has a very small and sharp point, which means the force applied is concentrated over a small area, resulting in high pressure that easily pierces the cloth.

(b) Mountaineers at times suffer from nose bleeding at high altitudes: As altitude increases, atmospheric pressure decreases, which can cause a reduction in the oxygen levels. This can lead to increased

blood flow to the brain and other organs, potentially causing capillaries in the nose to burst, leading to nosebleeds.

(c) It is easier to cut fruit with a sharp knife than with a blunt knife: A sharp knife concentrates the force applied onto a smaller area, increasing the pressure exerted on the fruit, making it easier to cut. A blunt knife spreads the force over a larger area, decreasing the pressure and making it harder to cut through the fruit.

(d) Porters place a turban/round pieces of cloth on their heads when they have to carry heavy loads: The turban or cloth acts as a cushion, distributing the force exerted by the load over a larger area of the porter's head, thereby reducing the pressure felt at any one point, which makes carrying the load more comfortable and prevents injury.

5. **Inflated Balloon:** When a balloon is inflated, the air inside it exerts pressure against the walls of the balloon, causing it to expand. If more air is pumped in, the pressure increases, making the balloon taut.

   Sealed Syringe: If you take a syringe, pull the plunger back while blocking the nozzle, and then release the plunger, you will feel the plunger being pushed back out. This is because the air inside the syringe exerts pressure on the plunger, trying to balance the external atmospheric pressure.

Chapter 9: Friction

A. 1. (c) 2. (a) 3. (c) 4. (a) 5. (d) 6. (d)

B. 1. motion 2. Kinetic 3. Rolling 4. friction 5. wasted

C. 1. Friction 2. Friction 3. Roughness 4. Drag 5. Lubricants

D. 1. Sliding friction is the resistance created by two objects sliding against each other. It occurs when one object moves across the surface of another object, and it typically requires less force to maintain movement than to start it due to static friction being higher than sliding friction.

2. Frictional force always acts in the direction opposite to the direction of motion. It acts to resist the movement and slows down the moving object.

3. Drag is a type of frictional force that occurs in fluids (like air or water). It opposes the motion of an object through the fluid, effectively slowing it down. Drag is influenced by the object's speed, its cross-sectional area, the density of the fluid, and the viscosity.

4. Athletes use shoes with spikes to increase their traction on the ground, particularly on track or field surfaces. The spikes dig into the ground, providing more grip and reducing the chance of slipping, thereby enhancing the athlete's ability to run faster and change direction more effectively.

5. Wet surfaces are more slippery because the presence of water reduces the friction between surfaces. Water acts as a lubricant, making the contact surface smoother and less able to grip, which increases the likelihood of slipping.

E. 1. Friction between two surfaces can be minimized through several methods:

   Lubrication: Applying lubricants such as oil, grease, or graphite between surfaces reduces the direct contact between them, lowering friction.

   Use of Ball Bearings: Implementing ball bearings in machines can reduce friction significantly. Ball bearings replace sliding friction with rolling friction, which is generally much lower.

   Surface Smoothing: Polishing or smoothing surfaces that come into contact can reduce irregularities, thereby decreasing friction. Smoother surfaces offer less resistance to motion.

2. Friction is primarily caused by the interlocking of irregularities on the surfaces of two objects that are in contact. The main causes are:

Surface Roughness: Even surfaces that appear smooth have microscopic peaks and valleys which can interlock and create resistance.

Adhesion: At the microscopic level, adhesive forces between contacting surfaces can also contribute to friction, especially in the case of smoother surfaces.

Deformation: Under pressure, surfaces may deform, increasing the actual contact area, which enhances friction.

3. There are several types of friction, each occurring under different circumstances:

   Static Friction: The force that resists the initiation of sliding motion between two surfaces that are in contact and at rest relative to one another.

   Sliding Friction: The force that resists the motion of an object sliding across a surface. It is generally less than static friction.

   Rolling Friction: Occurs when an object rolls over a surface. It is typically much less than sliding friction due to less surface area in contact.

   Fluid Friction: Also known as drag, this type of friction occurs when objects move through a fluid (liquid or gas). It depends on the object's speed, its cross-sectional area, the fluid's viscosity, and density.

4. **Friction as a Friend:**

   Walking and Running: Without friction between our shoes and the ground, it would be impossible to walk or run without slipping.

   Driving: Friction between car tires and the road surface allows vehicles to grip the road, making it possible to drive, turn, and stop safely.

   Writing: The friction between a pen and paper allows us to write. Without it, the pen would slide across the paper without leaving a mark.

   Friction as a Foe:

   Wear and Tear: Continuous friction between moving parts of machines leads to wear and tear, requiring replacement or repair.

   Energy Loss: In mechanical systems, friction converts kinetic energy into thermal energy, leading to efficiency losses.

   Overheating: Friction in engines and moving parts of machinery can cause overheating, potentially leading to mechanical failures.

5. Objects moving in fluids, such as cars, airplanes, and boats, have special shapes to minimize fluid friction or drag. This shaping is called streamlining. The streamlined shape allows the object to cut through the fluid more efficiently, reducing the drag force acting against it. By having a shape that allows air or water to flow smoothly around them, these objects can move faster and more efficiently, consuming less energy and increasing performance. This design is critical for high-speed vehicles and for reducing energy consumption in various transportation modes.

Chapter 10: Sound

A.	1.	(d)	2.	(b)	3.	(d)	4.	(c)	5. (a)
B.	1.	F	2.	F	3.	F	4.	T	5. F
C.	1.	(c)	2.	(d)	3.	(b)	4.	(e)	5. (a)

D. 1. Sound is produced when an object vibrates, creating pressure waves in the air or other media. These vibrations cause the surrounding medium to oscillate and propagate the waves away from the source, which can be detected as sound when they reach an ear.

2. **Musical Sound:** Typically has a pleasant, orderly, and harmonic structure; it is intentional and consists of regular vibrations.

   Noise: Generally consists of irregular or disordered vibrations and is often considered unwanted or unpleasant.

3. Frequency is the number of oscillations per second.

$$\text{Frequency} = \frac{\text{Number of oscillations}}{\text{Time in seconds}} = \frac{25 \text{ oscillations}}{5 \text{ seconds}} = 5 \text{ Hz}$$

4. **Drum:** The skin or membrane stretched over the opening of the drum vibrates.

   Flute: The air column inside the flute vibrates.

   Violin: The strings of the violin vibrate when they are bowed or plucked.

5. Appliances (blenders, vacuum cleaners, washing machines)

   Television and music systems at high volume

   Air conditioners and heaters

   Traffic noise from nearby roads

   DIY projects involving power tools

E. 1. The larynx, commonly known as the voice box, is located in the neck and plays a key role in sound production, breathing, and protecting the trachea against food aspiration. Sound is produced in the larynx when air from the lungs is expelled through it, causing the vocal cords (vocal folds) within the larynx to vibrate. The tension and length of the vocal cords can be adjusted, which changes the pitch and tone of the sound produced. When the vocal cords are close together, the air from the lungs causes them to vibrate, creating sound waves that are then modified by the throat, mouth, and nasal passages to produce speech.

2. Noise pollution refers to unwanted or disturbing sounds that affect the health and well-being of humans and other organisms. Common sources include vehicles, industrial processes, and activities in densely populated areas.

   Harmful effects of noise pollution include:

   Hearing Loss: Prolonged exposure to high noise levels can lead to temporary or permanent hearing impairment.

   Sleep Disturbances: Excessive noise can interrupt sleep patterns and reduce sleep quality, leading to fatigue and decreased performance.

   Cardiovascular Issues: Chronic noise exposure has been linked to increased rates of hypertension, heart disease, and stroke.

   Stress: Constant noise can increase stress levels, which in turn affects overall health and can lead to a variety of physical and mental conditions.

   Impaired Learning and Concentration: Noise can disrupt concentration and communication, affecting academic performance and productivity.

3. The ear can be divided into three parts: outer, middle, and inner ear.

   Outer Ear: Sound waves enter through the outer ear and travel down the ear canal, leading to the eardrum.

   Middle Ear: The sound waves cause the eardrum to vibrate. These vibrations are transmitted through three tiny bones in the middle ear called the ossicles (malleus, incus, and stapes). The stapes connects to the oval window that leads to the inner ear.

   Inner Ear: Vibrations passing through the oval window create waves in the fluids of the cochlea, located

in the inner ear. The cochlea is lined with thousands of tiny hair cells that convert these fluid waves into electrical signals. These signals are sent to the brain via the auditory nerve, and the brain interprets them as sound.

4. (a) Trees help reduce noise pollution by acting as a sound barrier. They also provide shade, improve air quality by absorbing pollutants, and enhance the aesthetic appeal of the area.

   (b) This is primarily due to differences in the size and tension of the vocal cords. Men generally have thicker and longer vocal cords, producing deeper (lower-pitched) voices, while women and children have shorter and thinner vocal cords, resulting in higher-pitched voices.

   (c) This is because light travels much faster than sound. Light travels at about 299,792 kilometers per second, whereas sound travels at about 343 meters per second in air. Thus, we see lightning almost instantaneously compared to the sound of thunder.

5. Controlling noise pollution can be achieved through several methods:

   Use of Sound Barriers: Constructing barriers such as walls or hedges around noisy areas can reduce the propagation of sound.

   Regulations and Laws: Implementing stricter regulations on noise levels in residential and commercial areas, especially during night-time hours.

   Soundproofing: Utilizing soundproof materials in buildings to reduce the entry or exit of unwanted sounds.

   Regular Maintenance of Machinery: Ensuring that machinery and vehicles are well-maintained to minimize noise emissions.

   Public Awareness: Educating the public about the sources and effects of noise pollution and promoting quieter practices and technologies.

Chapter 11: Chemical Effects of Electric Current

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

B. 1. positive 2. Distilled 3. Electroplating 4. rusting 5. electrolysis

C. 1. Silicon 2. Orbitals 3. Light Emitting Diode
4. Tin 5. Semiconductor

D. 1. Saltwater (solution of sodium chloride in water)

Lemon juice (contains citric acid, which ionizes to conduct electricity)

2. When the free ends of a tester are dipped into a conductive solution, an electric current flows through the circuit, creating a magnetic field around the wires. This magnetic field causes the magnetic needle to deflect, indicating the presence of an electric current.

3. Ensure all connections are tight and secure.

   Check the bulb to make sure it's working (replace if necessary).

   Verify that the power source (battery) is functional and correctly connected.

   Ensure that the circuit is complete and there are no breaks.

4. Distilled water can be made to conduct electricity by adding an electrolyte to it, such as salt, acid, or base, which dissociates into ions that facilitate the flow of electric current.

5. **Aluminum:** Often used for body parts due to its resistance to corrosion and light weight.

   Zinc: Frequently used in galvanizing steel parts to protect against rust.

E. 1. Electrolysis is a chemical process where electrical current is passed through a substance that contains ions (typically a solution of ions or a molten ionic compound) to cause a chemical reaction. This reaction decomposes the compound into its constituent elements or new substances.

Electrolyte is a substance that contains free ions and can behave as an electrically conductive medium. Electrolytes are typically solutions of acids, bases, or salts.

Chemical effects of electric current refer to the changes that occur in chemical substances due to the passage of an electric current through them, such as the decomposition of compounds or the deposition of elements from solutions.

Changes due to this effect include:

Decomposition of chemical compounds.

Production of gases at electrode surfaces.

Deposition of metals on electrodes.

Change in color or chemical composition of solutions.

2. A compass needle deflects due to the magnetic field created by electric current flowing through a conductor. Sea water conducts electricity better than tap water because it contains higher concentrations of salts, which ionize into free ions that facilitate the flow of electric current. The better the conductivity of the solution through which the current flows, the stronger the magnetic field generated around the conductor, causing a greater deflection of the compass needle.
3. Common electroplated objects include:

Jewelry and watches (often plated with gold or silver to enhance appearance and resistance to corrosion).

Bathroom fixtures such as faucets and shower heads (chrome plating is common for aesthetics and corrosion resistance).

Car parts, such as bumpers and rims (often plated with chromium for durability and shine).

Electronic components (gold or tin plating is used for reliable electrical conductivity and corrosion resistance).

4. Draw Diagram Yourself.

Explanation:

When the circuit is completed, copper ions (Cu^2+) from the copper sulfate solution move towards the iron spoon (cathode) and gain electrons to deposit copper metal.

At the anode, copper atoms lose electrons and become copper ions, replenishing those consumed at the cathode.

5. Electroplating is a process that uses electrical current to reduce dissolved metal cations so that they form a coherent metal coating on an electrode. It is used to deposit a layer of metal onto a conductive surface to enhance its properties, such as corrosion resistance, abrasion resistance, aesthetic qualities, or electrical conductivity.

Steps to carry out electroplating of copper in a laboratory:

Prepare the Electrolyte: Dissolve copper sulfate in water to create an electrolyte solution.

Setup the Electrodes: Submerge two electrodes into the electrolyte solution; an iron object as the cathode (to be plated) and a pure copper bar as the anode.

Connect to Power Source: Attach the cathode and anode to the negative and positive terminals of a DC power supply, respectively.

Begin Electroplating: Turn on the power supply to start the electroplating process. Ensure the voltage is not too high to avoid rapid deposition, which can result in a brittle coat.

Monitor the Process: Allow the object to plate until the desired thickness of copper is achieved.

Finishing: Once plating is complete, turn off the power supply, remove the iron object, rinse it with distilled water, and dry it.

Chapter 12: Some Natural Phenomena

A. 1. (b) 2. (d) 3. (a) 4. (c) 5. (c)

B. 1. F 2. F 3. F 4. T 5. F

C. 1. Insulator 2. Lightning 3. Faults 4. Seismograph

D. 1. When we touch a charged body, our body conducts the charge away to the ground, effectively discharging it because the human body is a conductor of electricity, allowing charges to flow freely.

2. Charging by friction involves rubbing two different materials together, which leads to a transfer of electrons from one material to another, resulting in one object gaining a positive charge (losing electrons) and the other a negative charge (gaining electrons).

3. A lightning conductor is a device used to protect structures from lightning damage by providing a direct path for the lightning charge to reach the ground safely. It usually consists of a metal rod mounted on the top of the building and connected to the ground through a system of conductors.

4. Gujarat (especially Bhuj and surrounding areas), Jammu and Kashmir (particularly the Himalayan region), and the Northeastern states of India including Assam and Manipur are notably earthquake-prone.

5. **Volcanic activity:** Eruptions can induce seismic activities in the surrounding regions.

   Human activities: Such as mining, reservoir-induced seismology due to large dams, and deep underground excavations can also cause earthquakes.

E. 1. Draw diagram yourself.

   An Electroscope is a device that can detect electric charges. It typically consists of a metal rod connected to a metal knob and two thin gold or aluminum leaves (or strips) enclosed in a glass jar.

2. Lightning is a natural electrical discharge caused by imbalances between storm clouds and the ground, or within the clouds themselves. This occurs when:

   Charge Separation develops in storm clouds, with positive charges accumulating at the top and negative charges at the bottom. This creates a strong electric field within the cloud and between the cloud and the ground.

   The electric field becomes so strong that it breaks down the air resistance in the cloud or between the cloud and the earth, leading to a rapid discharge of electricity.

   This discharge ionizes the air, creating a brilliant flash of light (lightning) and a rapid expansion of air, which results in the thunder sound.

3. **Stay Indoors:** Avoid going outside during a storm. If you're already outside, seek shelter immediately in a substantial building or in a fully enclosed metal-topped vehicle.

   Avoid Conductive Paths: Inside a building, stay away from windows, doors, and anything that could conduct electricity, like telephones, appliances, sinks, bathtubs, and electrical outlets.

   Do Not Lie Flat on the Ground: If caught outside with no shelter during lightning, crouch down with your heels touching and your hands over your ears to minimize contact with the ground. Avoid open fields or high places.

   Use Lightning Rods: Install lightning rods on your home or building. These rods are metal conductors

mounted on the roof connected to the ground through a wire, which directs the lightning charge into the ground, thereby protecting the structure from damage.

4. Stay Calm and Move to an Open Area: Avoid power lines, buildings, and trees. Open areas are safest if you are caught outside during an earthquake.

   Do Not Enter Buildings: Structures might be weakened during an earthquake and could collapse during aftershocks.

   Stay Alert: Be aware of your surroundings and watch out for falling debris or unstable ground.

   Drop, Cover, and Hold On: If moving to an open area isn't possible, drop to the ground, take cover under a sturdy piece of furniture, and hold on until the shaking stops.

5. **Earthquake-Resistant Construction:** Ensure homes and buildings are built to withstand earthquakes, using materials and techniques designed for seismic activity.

   Emergency Preparedness: Maintain an emergency kit with food, water, first aid, a flashlight, and other essentials. Know the emergency evacuation routes and plans.

   Secure Heavy Furniture and Items: Anchor heavy furniture, appliances, and shelves to walls. Secure items that could fall and cause injury.

   Regular Drills: Conduct and participate in regular earthquake drills to ensure everyone knows what to do when an earthquake occurs.

   Educate and Inform: Stay informed about the latest safety protocols and educate all family members, including children, about what to do before, during, and after an earthquake.

Chapter 13: Light

A.	1.	(d)	2.	(d)	3.	(a)	4.	(a)	5. (b)
B.	1.	incident ray	2.	reflection	3.	same	4.	specular	5. Rainbow
C.	1.	(b)	2.	(d)	3.	(e)	4.	(c)	5. (a)

D. 1. The image would appear at a distance of 5cm behind the mirror. Therefore, the total distance from the object to the image would be 10cm.

2. When a coin is placed between two parallel mirrors, an infinite number of images will be formed due to the multiple reflections occurring between the two mirrors.

3. The blind spot in the human eye is the point on the retina where the optic nerve passes through the retina to exit the eye. There are no photoreceptor cells (rods or cones) in this region, making it insensitive to light, thus creating a "blind spot" where no vision is detected.

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

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

5. The image is virtual (it cannot be projected on a screen).

   It is erect (maintains the same orientation as the object).

   It is laterally inverted (left appears as right and vice versa).

   The size of the image is equal to the size of the object.

   The distance from the object to the mirror is the same as from the image to the mirror.

E. 1. Regular Reflection occurs when light rays are reflected from a smooth, polished surface, such as a mirror. The reflected rays remain parallel if the incident rays are parallel, and the angle of incidence equals the angle of reflection for each ray. This type of reflection results in clear, well-defined images.

Irregular Reflection (or Diffuse Reflection) occurs when light rays strike a rough surface, such as paper or unpolished wood. The surface irregularities cause the reflected rays to scatter in many directions. This type of reflection does not produce a clear image.

Draw diagram yourself.

2. This principle is a foundational concept in optics, demonstrated by the law of reflection. When an incident ray strikes a surface, it, the reflected ray, and the normal (the line perpendicular to the point of incidence) all lie in the same plane. This can be demonstrated with a simple experiment using a plane mirror, a laser beam (as the incident ray), and a piece of paper to observe the alignment of the rays.

   Experimental Setup:

   Shine a laser beam onto a plane mirror at an angle.

   Use a piece of paper to trace the direction of the incident and reflected rays.

   Place a straight edge or another piece of paper to represent the normal at the point of incidence.

   Observe and trace how the normal, the incident ray, and the reflected ray align along the same flat surface or "plane."

3. Do it yourself.

4. For this scenario:

   When a ray of light strikes the first mirror at a 40° angle of incidence, it will reflect off at a 40° angle on the other side of the normal.

   The ray then hits the second mirror, positioned at a right angle to the first. The incident angle to the second mirror will also be 40°, and it will reflect off this mirror at the same angle, continuing the path symmetrically on the opposite side.

5. **Why?**

   Eye care is essential to maintain good vision and prevent diseases or injuries that could impair sight. Regular eye care can detect problems early, leading to more effective treatments.

   How?

   Regular Eye Exams: Visit an eye care professional regularly to catch and treat issues early.

   Protective Eyewear: Use sunglasses to protect against UV rays and safety glasses when engaging in activities that could harm the eyes.

   Proper Lighting: Use adequate lighting to avoid eye strain when reading or working.

   Limit Screen Time: Take breaks during long periods of screen use to reduce eye strain and dryness.

   Healthy Diet: Eat foods rich in vitamins C and E, zinc, lutein, and omega-3 fatty acids to support eye health.

   Hygiene: Avoid touching your eyes with dirty hands and follow proper guidelines when using contact lenses.

Revision Test Paper-1

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

B. 1. F 2. F 3. F 4. F 5. T

C. 1. Organ transfer 2. Pathogen 3. Graphene 4. Sodium
5. Chemicals from petroleum

Revision Test Paper-2

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

B. 1. T 2. F 3. F 4. T 5. T

C. 1. Carbon monoxide 2. Variety of life 3. Amoeba and Paramecium
4. Fertilized egg 5. Testosterone and Estrogen

Revision Test Paper-3

A. 1. (c) 2. (c) 3. (d) 4. (b) 5. (a)

B. 1. (e) 2. (a) 3. (d) 4. (b) 5. (c)

C. 1. Newton 2. Lubricant 3. Funnel 4. Light Emitting Diode
5. Silicon

Revision Test Paper-4

A. 1. (b) 2. (d) 3. (d) 4. (b) 5. (c)

B. 1. (c) 2. (a) 3. (b) 4. (e) 5. (d)

C. 1. Insulator 2. Violet, Indigo, Blue, Green, Yellow, Orange, Red (VIBGYOR)
3. Star pattern 4. Carbon monoxide 5. Dispersion

Model Test Paper-1

A. 1. **Kharif crops:** Rice and Maize. These are typically sown at the beginning of the rainy season and harvested at the end of the monsoon.

Rabi crops: Wheat and Barley. These are sown at the start of the winter and harvested in the spring.

2. Weeds are undesirable plants that grow spontaneously in agricultural settings, competing with cultivated plants for nutrients, light, and space.

Control methods include mechanical cultivation, chemical herbicides, and biological control techniques such as introducing natural predators.

3. Major groups include bacteria, viruses, fungi, protozoa, and algae. These microorganisms play diverse roles in ecosystems, including decomposition, photosynthesis, and as pathogens.

4. Antibiotics are substances produced by or derived from certain microbes that can kill or inhibit the growth of other microorganisms, especially bacteria. They are widely used in medicine to treat infections.

5. Synthetic fibers are fibers made through chemical synthesis, as opposed to natural fibers that are directly derived from living organisms. Examples include nylon, polyester, and acrylic.

6. A polymer is a large molecule composed of repeating structural units (monomers) typically connected by covalent chemical bonds. Natural examples include DNA and proteins, while synthetic examples include plastics like polyethylene and nylon.

7. Sodium and potassium are highly reactive metals that react vigorously with oxygen and water. They are stored in kerosene to prevent them from coming into contact with moisture or oxygen, which could cause them to ignite or explode.
8. Coal gas is a fuel commonly used for municipal lighting and heating, produced during the destructive distillation of coal. Its major constituents include hydrogen, methane, and carbon monoxide.
9. Carbonization is the process where organic substances are converted into carbon or carbon-containing residues through pyrolysis, typically under conditions of high temperature and limited air supply, as in the formation of coal.
10. An explosion is a rapid increase in volume and release of energy in an extreme manner, usually with the generation of high temperatures and the release of gases. Explosions create shock waves and are generally destructive.

B. 1. monoculture 2. microscope 3. polymers 4. Anthracite 5. hydrocarbons
6. planet 7. Amoeba and Paramecium 8. tadpole 9. Yeast
10. adolescence

C. 1. (e) 2. (d) 3. (b) 4. (a) 5. (c)

D. 1. Plowing and leveling the soil are critical agricultural practices. Plowing helps aerate the soil, making it easier for roots to penetrate deeply, enhancing water retention and facilitating the decomposition of organic matter, thereby enriching the soil. Leveling is done post-plowing to create a flat surface that aids in uniform water distribution and prevents soil erosion, ensuring seedbeds are optimal for planting and growth.
2. Microorganisms play essential roles in various spheres of human life. They aid in the decomposition of organic matter and recycling of nutrients in ecosystems. Microorganisms are pivotal in food production, contributing to the making of bread, cheese, yogurt, and alcoholic beverages through fermentation. They are instrumental in medical applications, including the production of antibiotics, vaccines, and are used in genetic engineering. Environmental cleanup also benefits from microbes, particularly in treating sewage and cleaning up oil spills. Additionally, they help in agricultural practices, such as nitrogen fixation, which enriches soil fertility.
3. The campaign against plastics stems from their significant environmental impact. Plastics are predominantly non-biodegradable, persisting in ecosystems for hundreds of years, leading to severe pollution. They accumulate in water bodies, posing threats to aquatic life through ingestion and entanglement. Plastics also contribute to landfill waste and when burned, release toxic chemicals into the atmosphere. Reducing plastic use helps mitigate environmental pollution and promotes sustainability.
4. Coal forms from the remains of vegetation such as ferns and trees that lived millions of years ago. These plants died in swampy areas and were buried under layers of mud, sand, and other sediments. Over time, the accumulation of these layers exerted immense pressure and heat on the buried matter. This process, called carbonization, transformed the original plant material into peat and through further compaction and carbonization over millions of years, into various types of coal.
5. Burning fuels poses several hazards, including air pollution from the emission of harmful gases like carbon monoxide, sulfur dioxide, and nitrogen oxides, which contribute to respiratory problems, acid rain, and smog. It also leads to global warming as carbon dioxide, a major greenhouse gas, is released, enhancing the greenhouse effect. Furthermore, incomplete combustion of fuels can produce particulates that cause severe health issues like lung cancer and heart disease.
6. Conserving forests and wildlife is crucial for maintaining biodiversity, which ensures ecosystem stability and resilience. Forests play a key role in regulating climate, absorbing carbon dioxide, and providing oxygen. They also support countless species including humans, offering habitat, food, and medicine.

Protecting wildlife and forests helps preserve ecological balance and provides recreational, aesthetic, and economic benefits to humans.

7. The nucleus is often considered the control center of the cell because it houses most of the cell's genetic material in the form of DNA. This genetic material is crucial for directing all cellular functions including growth, metabolism, protein synthesis, and cell division, making it essential for the survival and reproduction of the cell.
8. In vitro fertilization (IVF) is a medical procedure in which an egg is fertilized by sperm outside the body, in a laboratory dish. Once fertilization occurs and the zygote begins to develop into an embryo, it is then implanted in the uterus. IVF is a major fertility treatment for couples who cannot conceive naturally, involving controlled ovarian hyperstimulation, egg retrieval, fertilization, and embryo transfer.
9. During puberty, several significant physical and hormonal changes occur. Boys experience growth in genitalia, deepening of the voice, and hair growth on the face, chest, and pubic area. Girls develop breasts, start menstruating, and also see pubic and underarm hair growth. Both genders undergo growth spurts in height and weight, and sebaceous and sweat glands become more active, sometimes leading to acne.
10. Maintaining good reproductive health involves practicing safe sexual behaviors, undergoing regular medical check-ups, and receiving vaccinations like HPV and Hepatitis B. It's also important to maintain good hygiene, adopt a balanced diet rich in essential nutrients, and manage stress effectively. Additionally, staying informed about reproductive health issues and seeking prompt medical attention for any concerns is vital.

Model Test Paper-2

A. 1. False. Electrostatic force is a non-contact force. It acts between charged bodies from a distance without the need for physical contact.

2. Sliding friction is the resistance created by two objects sliding against each other. It occurs when one object moves or slides over the surface of another. It is generally less than static friction, which must be overcome to start moving.
3. Musical sound is structured and pleasant to the ears, consisting of regular and predictable vibrations or waves. Noise, on the other hand, is chaotic and unpleasant, consisting of irregular and unpredictable vibrations.
4. Saltwater and tap water are good conductors of electricity. Both contain ions that facilitate the movement of electric charge.
5. A lightning conductor (or lightning rod) is a device used to protect buildings from lightning strikes. It is typically a metal rod mounted on the top of a building and connected to the ground through a wire. It works by providing a low-resistance path to the ground, safely directing the high voltage currents of a lightning strike away from the structure.

B. 1. pull 2. motion 3. medium 4. electrolysis 5. ultrasonic

C. 1. (e) 2. (d) 3. (a) 4. (b) 5. (c)
(f)

Test Paper-1

A. 1. (c) 2. (a) 3. (b) 4. (a) 5. (d)

6. (a) 7. (c) 8. (d) 9. (b) 10. (c)

B. 1. Kharif 2. Teflon 3. Rayon 4. Sodium and potassium
5. Graphite

C. 1. T 2. F 3. F 4. T 5. T

D. 1. Essential conditions for combustion include the presence of a combustible substance, oxygen (or another oxidizer), and a source of heat to reach the ignition temperature.

2. Malleability is a property of a material that allows it to be deformed under compressive stress, typically by hammering or rolling into thin sheets. Examples include gold and silver.

3. The nucleus serves as the control center of a cell, housing the cell's DNA and managing functions such as growth, metabolism, protein synthesis, and reproduction (cell division).

4. Endangered species are those at risk of extinction due to reduced populations. Examples include the Amur Leopard and the Black Rhino.

5. Basic practices of crop production include plowing, sowing, adding manure and fertilizers, irrigation, weeding, harvesting, and storage.

E. 1. Irrigation is the artificial application of water to soil or land to assist in the growing of agricultural crops and vegetation. It is crucial in areas where rainfall is insufficient or variable. In India, two modern methods of irrigation commonly used are:

Drip Irrigation: This method involves delivering water directly to the roots of plants through a system of tubes, pipes, and emitters. It is highly efficient as it reduces water wastage and evaporation. Drip irrigation is especially beneficial for high-value crops and arid regions where water conservation is critical.

Sprinkler Irrigation: This method mimics natural rainfall by distributing water through a system of pipes usually by pumping. It is sprayed into the air and irrigates entire soil surfaces through spray heads so that it breaks up into small water drops which fall to the ground. Sprinkler irrigation is suitable for a variety of terrains and helps in covering larger areas.

Both methods help in conserving water compared to traditional techniques like flood or furrow irrigation, contributing significantly to sustainable agriculture practices.

2. Draw diagram yourself.

Differences from Animal Cell:

Plant cells have a cell wall, chloroplasts, and a large central vacuole, which are absent in animal cells.

Animal cells are more flexible in shape due to the lack of a rigid cell wall.

Animal cells often have more than one and smaller vacuoles compared to the single, large central vacuole in plant cells.

Plant cells can perform photosynthesis, a capability that animal cells lack.

3. Conservation of forests and wildlife sanctuaries is essential for several reasons:

Biodiversity Preservation: Forests and sanctuaries are home to a vast array of species. Conserving these areas ensures the survival of countless plant and animal species, maintaining biodiversity and genetic diversity essential for ecological stability.

Environmental Health: Forests play a critical role in carbon sequestration, helping to mitigate climate change. They regulate atmospheric gases, purify water, and prevent soil erosion.

Cultural Values: Many communities rely on forests for cultural, spiritual, and recreational activities. Conservation helps preserve these values.

Economic Benefits: Many industries, such as tourism, pharmaceuticals, and forestry, depend on the sustainable management of natural resources found in these areas.

Ecological Services: Forests provide invaluable ecological services including water cycle regulation, pollination, seed dispersal, and disease regulation.

4. The human endocrine system is a network of glands that produce and release hormones directly into the circulatory system to be delivered to various organs. These hormones regulate numerous body functions, including metabolism, growth and development, tissue function, and mood.

   Key Components Include:

   Pituitary Gland: Often called the "master gland" because it controls other endocrine glands and regulates critical body processes.

   Thyroid Gland: Regulates metabolism, energy generation, and neural growth.

   Adrenal Glands: Produce hormones that help regulate metabolism, immune system, and stress response.

   Pancreas: Produces insulin and glucagon, crucial for maintaining blood glucose levels.

   Gonads (Ovaries and Testes): Produce sex hormones that influence sexual development and reproduction.

Test Paper-2

A. 1. (c) 2. (b) 3. (d) 4. (d) 5. (b)
6. (d) 7. (b) 8. (c) 9. (a) 10. (c)

B. 1. Mars 2. gravitational force 3. light-year
4. vibrating 5. acids and salts

C. 1. T 2. T 3. F 4. T 5. F

D. 1. The pitch of a sound is determined by its frequency. Higher frequencies produce higher pitches, while lower frequencies result in lower pitches.

2. Two significant artificial satellites launched by India are INSAT (Indian National Satellite System) and IRS (Indian Remote Sensing Satellite).

3. The Braille system is a tactile writing system used by people who are visually impaired. It consists of raised dots that individuals feel with their fingertips.

4. The crackling sound is due to static electricity, which builds up due to the friction between the sweater and your body or other clothing, especially in dry winter air.

5. Persistence of vision is the phenomenon where the retina retains an image for a brief moment after the object is gone. This principle is what allows motion pictures to appear fluid and continuous when viewed.

E. 1. Lightning is a natural electrical discharge caused by imbalances between storm clouds and the Earth, or within the clouds themselves. Here's how it occurs:

   Charge Separation: Within a storm cloud, rising and descending air currents create areas with varying charges. Typically, positive charges accumulate at the top of the cloud and negative charges at the bottom.

   Electric Field Formation: This separation of charges generates an intense electric field within and below the cloud. The strength of the field becomes strong enough to overcome the air's insulating properties.

   Leader Formation: A stepped leader (a stream of partially charged particles) forms from the cloud and moves towards the Earth in a series of steps. This invisible leader searches for a path with least resistance.

Connecting to Ground: Objects on the ground (like trees, buildings, or even the ground itself), respond by sending up a streamer (a positive charge).

Return Stroke: When a leader and a streamer connect, they create a path for electric discharge. This allows for a powerful current to flow from the ground to the cloud, which we see as the bright flash of lightning.

2. Draw diagram yourself.
3. Acid Rain is precipitation that contains high levels of sulfuric or nitric acids. It can form through the emission of sulfur dioxide and nitrogen oxides, which transform into acids when they contact water vapor in the atmosphere.

   Effects of Acid Rain:

   Ecosystem Damage: Acidifies water bodies, harming aquatic life.

   Soil Degradation: Alters soil chemistry, damaging plant life and reducing agricultural productivity.

   Building Damage: Corrodes building materials and historical monuments, particularly those made of limestone and marble.

   Health Problems: Contributes to respiratory issues in humans by carrying pollutants in small droplets.
4. The Greenhouse Effect is a natural process where certain gases in Earth's atmosphere (like carbon dioxide, methane, and water vapor) trap heat from the sun. This trapped heat helps to warm the Earth's surface to a life-supporting average of 15 degrees Celsius.

   However, human activities such as burning fossil fuels, deforestation, and industrial processes are increasing the concentrations of these greenhouse gases, leading to an enhanced greenhouse effect. This results in global warming and climate change, causing shifts in weather patterns, rising sea levels, and more extreme weather events.
5. **Know Your Risks:** Identify what natural disasters are common in your area.

   Emergency Kit: Keep a kit with essentials like water, food, medications, and important documents.

   Evacuation Plan: Have a clear plan on where to go and how to communicate with family members.

   Secure Your Home: Reinforce structures and secure heavy objects to reduce damage.

   Stay Informed: Use a weather radio or apps to stay updated on emergency information and alerts.