Spectrum: Science -8 (2025)

Chapter 1: Crop Production and Management

A. Tick the correct option

1. (a) Broilers
2. (b) Vitamin D
3. (c) Rabi crops
4. (a) Horticulture
5. (a) Winnowing

B. Fill in the blanks

1. Urea and NPK
2. Tulsi, Neem and Aloe vera
3. removing weeds / loosening soil
4. scattering seeds by hand
5. shifting seedlings from nursery to field

C. Match the following

1 → (e) Chemical fertilizers
2 → (c) Honeybees
3 → (b) Harvesting
4 → (a) Irrigation
5 → (d) Crop protection

D. True / False

1. True
2. False (Milch animals give milk, not meat)
3. False (It is called animal husbandry, not agriculture)

E. Answer the following

- **Very Short Answer Questions**

1. Kharif crops – Crops grown in rainy season (June–Oct), e.g., rice, maize.
2. Agriculture – Practice of growing crops and rearing animals.
3. Types based on products: Cereals, Pulses, Oilseeds, Fibres
4. Methods of sowing: Broadcasting, Seed drill, Transplantation

◆ Short Answer Questions

1. Broadcasting is the method of scattering seeds by hand over the field, while tilling is the process of loosening and turning the soil to make it suitable for sowing.
2. The application of fertilizers is necessary in a crop field because it replenishes the nutrients in the soil, improves soil fertility, and increases the overall yield of crops.
3. Multiple cropping is the practice of growing more than one crop in a year on the same land, while field fallowing is the practice of leaving land uncultivated for some time to restore its fertility.

◆ Long Answer Questions

1.

The different methods employed for crop production include preparation of soil, sowing, adding manure and fertilizers, irrigation, weeding, harvesting and storage. First, the soil is prepared by ploughing and levelling to make it loose and suitable for plant growth. After that, healthy seeds are selected and sown at proper depth and distance. Manure and fertilizers are then added to provide essential nutrients to the soil. Irrigation is done to supply water to the crops at regular intervals. Weeding is carried out to remove unwanted plants that compete with crops for nutrients. When the crops mature, they are harvested using tools like sickles or machines. Finally, the grains are stored properly to protect them from pests and moisture.

2.

(a) Kharif and Rabi crops

Kharif crops are grown during the rainy season from June to October and require plenty of water, such as rice and maize. Rabi crops are grown during the winter season from October to March and require less water, such as wheat and mustard. These crops depend on seasonal climatic conditions for proper growth.

The division of crops into Kharif and Rabi helps farmers plan their agricultural activities efficiently. Proper timing of sowing and harvesting is important for good yield. These crop seasons are an important part of Indian agriculture.

(b) Soil preparation

Soil preparation is the first step in crop production and includes ploughing, levelling and manuring. Ploughing loosens the soil and improves aeration, which helps roots grow easily. Levelling ensures uniform distribution of water in the field. Adding manure increases soil fertility by supplying nutrients. It also improves the structure and water-holding capacity of soil. Proper soil preparation leads to better crop growth and higher yield.

(c) Sowing

Sowing is the process of placing seeds in the soil at the correct depth and spacing. Good quality and healthy seeds are selected before sowing. Seeds can be sown by broadcasting or by using a seed drill. Proper spacing ensures that plants get enough sunlight, nutrients and water. If seeds are sown too deep or too shallow, they may not grow properly. Therefore, correct sowing methods are essential for a healthy crop.

(d) Fertilizers

Fertilizers are chemical substances that are added to soil to provide essential nutrients like nitrogen, phosphorus and potassium. They help in the rapid growth of plants and increase crop yield. However, excessive use of fertilizers can harm soil health and pollute water bodies. Therefore, fertilizers should be used carefully and in proper amounts. They are an important part of modern agriculture.

(e) Irrigation

Irrigation is the process of supplying water to crops at regular intervals. It is necessary because crops need water for growth and development. Different methods of irrigation include traditional methods, sprinkler system and drip irrigation. Modern methods like drip irrigation help in conserving water. Proper irrigation ensures healthy plant growth and better yield. Lack of water can lead to poor crop production.

(f) Harvesting

Harvesting is the process of cutting and collecting mature crops from the field. It is done when crops are fully grown and ready. Crops can be harvested manually using sickles or by machines like harvesters. After harvesting,

threshing is done to separate grains from chaff. Proper harvesting ensures good-quality produce. It is an important step in crop production.

(g) Crop protection

Crop protection involves protecting crops from weeds, pests and diseases. Weeds are unwanted plants that compete with crops for nutrients and water. Pesticides and herbicides are used to control pests and weeds. Crop rotation and biological methods are also used for protection. Proper crop protection increases yield and improves quality. It is essential for successful farming.

Cognitive Corner

HOTS

1.

Agriculture is the practice of growing different types of crops like rice, wheat and jowar along with rearing animals, whereas plantation is the large-scale cultivation of a single crop such as tea or coffee. Agriculture involves mixed farming and is done on different scales, while plantation farming focuses on one crop and requires more labour and capital. Plantation is usually practiced in specific regions with a suitable climate. Both are important for food and economic development.

2. Yes, retaining stubble in the fields helps the soil because it prevents soil erosion by holding the soil firmly with roots. It also adds organic matter to the soil when it decomposes, which improves soil fertility. Stubble helps in retaining moisture in the soil and supports beneficial microorganisms. It reduces the loss of topsoil caused by wind and water. Therefore, it is useful for maintaining soil health**.**

RESEARCH AND PROJECT

Farmers in my area grow crops like wheat, rice, sugarcane and vegetables. They face many difficulties such as the high cost of seeds, fertilizers and pesticides. Due to globalization, the prices of crops often fluctuate, which affects their income. There is also a shortage of labour during peak seasons like sowing and harvesting. Unpredictable rainfall and poor irrigation facilities make farming more difficult. Farmers also face problems due to pests and diseases. Therefore, farming requires proper planning and support from the government.

GROUP DISCUSSION

Fertilizers increase crop yield but their excessive use harms soil and the environment. To reduce their use, farmers can use organic manure such as

compost and green manure. Crop rotation can also help in maintaining soil fertility naturally. Biofertilizers can be used as an eco-friendly option. Proper soil testing should be done before using fertilizers. Farmers should use balanced amounts instead of overusing them. These measures help in sustainable agriculture.

WRITING SKILL

Paragraph on "Green Revolution"

The Green Revolution began in India in the 1960s and brought a major change in agriculture. It introduced high-yielding variety seeds, chemical fertilizers and modern irrigation methods. This led to a significant increase in food production, especially in crops like wheat and rice. It helped India become self-sufficient in food grains. However, it also increased the use of chemicals, which affected soil health. The Green Revolution played an important role in improving the agricultural landscape of India.

OBSERVATION SKILL

Explore latest farming techniques

Modern farming techniques include strip-till farming and cover crop farming. Strip-till farming disturbs only a small part of the soil, which helps in reducing soil erosion and saving moisture. Cover crop farming involves growing crops that protect and improve soil fertility. These techniques help in conserving soil and water. They also reduce the need for chemical fertilizers. Therefore, modern techniques make farming more sustainable and efficient.

THINK AND WRITE

Animal husbandry is the practice of rearing animals for useful products like milk, eggs and meat. Milch animals such as cows and buffalo are reared for milk production. Poultry farming involves rearing birds like hens for eggs and meat. Pisciculture is the farming of fish in ponds or tanks. Apiculture is the rearing of honeybees for honey production. These activities provide additional income to farmers. Animal husbandry is an important part of agriculture.

DO YOURSELF

1.

(a) Crop
(b) Preparation
(c) Float
(d) Water, nutrients

2.

(i) → (d) Paddy and maize
(ii) → (a) Food for cattle
(iii) → (b) Urea and super phosphate
(iv) → (c) Animal excreta, etc.

3. Give two examples of each

1. Two examples of Kharif crops are rice and maize.
2. Two examples of Rabi crops are wheat and gram.

4. Write a paragraph in your own words on each

(1) Preparation of soil

Preparation of soil is the first step in crop production. It involves ploughing, levelling and adding manure to make the soil fertile. Ploughing loosens the soil and improves aeration, which helps the roots grow easily. Levelling ensures equal distribution of water in the field. Adding manure increases soil fertility by supplying nutrients. Proper soil preparation leads to better crop growth and higher yield.

(2) Sowing

Sowing is the process of placing seeds into the soil at the correct depth and spacing. Healthy and good quality seeds are selected before sowing. Seeds can be sown by broadcasting or by using a seed drill. Proper spacing helps plants receive enough sunlight, nutrients and water. Correct sowing ensures good germination and healthy crop growth.

(3) Weeding

Weeding is the process of removing unwanted plants called weeds from the field. Weeds compete with crops for nutrients, water and sunlight. They can be removed manually or by using weedicides. Timely weeding helps crops grow better and increases yield. It is an important step in crop protection.

(4) Threshing

Threshing is the process of separating grains from the harvested crop. It is done after harvesting. Threshing can be carried out manually or by machines. It helps in obtaining clean grains. After threshing, winnowing is done to separate lighter chaff from grains. It is an essential step before storage.

5.

Fertilizers are chemical substances that provide nutrients to plants quickly, whereas manure is a natural substance made from plant and animal waste that improves soil fertility slowly. Fertilizers are rich in specific nutrients like nitrogen, phosphorus and potassium, while manure adds organic matter to the soil. Excessive use of fertilizers can harm soil and the environment, whereas manure is eco-friendly. Therefore, manure improves soil structure while fertilizers mainly increase crop yield.

6. Irrigation is the process of supplying water to crops at regular intervals. Two methods that conserve water are drip irrigation and sprinkler irrigation. In drip irrigation, water is supplied directly to the roots of plants drop by drop, which reduces wastage. In sprinkler irrigation, water is sprayed over the crops like rainfall, ensuring even distribution. Both methods save water and are efficient.

7. If wheat is sown in the Kharif season, it will not grow properly because it requires cool weather and less rainfall. The excessive rain and high temperature of the Kharif season are not suitable for wheat. This may lead to poor growth and low yield. Therefore, wheat is grown only in the Rabi season.

8. Continuous plantation of crops in a field reduces soil fertility because the same nutrients are repeatedly used by crops. This leads to nutrient depletion in the soil. As a result, the soil becomes less productive over time. To prevent this, crop rotation and the use of manure are necessary. Therefore, continuous cropping negatively affects soil health.

9. Weeds are unwanted plants that grow along with crops and compete for nutrients, water and sunlight. They can be controlled by manual removal using tools like a hoe or by using chemicals called weedicides. Crop rotation and proper field management also help in controlling weeds. Removing weeds improves crop growth and yield.

10.The correct sequence is:
Preparation of soil → Ploughing the field → Sowing → Manuring → Irrigation → Harvesting → Sending crop to sugar factory

Word Puzzle Answers

Down

1. Irrigation
2. Storage

5. Crop

Across
3. Harvester
4. Gram
6. Winnowing

Chapter 2: Microorganisms: Friend and Foe

A. Tick (✓) the correct option

1. (b) Microbiology
2. (d) Omnipresent
3. (a) Cyst
4. (a) Spherical shape

B. Fill in the blanks

1. Acquired Immunodeficiency Syndrome.
2. 5–10 µm.
3. saprophytic or parasitic.
4. Penicillin.

C. Match the following

1 → (e) HIV
2 → (c) Flagella
3 → (d) Food preservation
4 → (b) *Mycobacterium tuberculosis*
5 → (a) 1928

D. True / False

1. **False**
2. **False**
3. **False**

E. Answer the following

- **Very Short Answer Questions**

1. Two examples of algae are Chlamydomonas and Spirogyra.
2. The structural components of a bacterium include the cell wall, cell membrane, cytoplasm, nucleus and flagella.
3. Gram-positive bacteria retain the violet stain, whereas Gram-negative bacteria do not retain it and appear pink after staining.
4. Measles is a viral disease that spreads through the air and causes fever, cough and red rashes on the body.
5. Food preservation is required to prevent food from spoilage caused by microorganisms and to increase its shelf life.

- **Short Answer Questions**

1. Algae are simple plant-like organisms that contain chlorophyll and can prepare their own food by photosynthesis. They are mostly found in water bodies and can be unicellular or multicellular.
2. Protozoa are unicellular microorganisms that can move on their own and are mostly found in water. Some protozoa are beneficial, while others can cause diseases such as malaria.
3. Pasteurisation is the process of heating food like milk at a specific temperature and then cooling it to kill harmful microorganisms, while sterilisation is the destruction of all microorganisms. Pasteurisation is used for milk, whereas sterilisation is used for canned food and medical equipment.

- **Long Answer Questions**

1. Microorganisms are tiny living organisms that cannot be seen with the naked eye and require a microscope to be observed. They are found everywhere in air, water, soil and inside living organisms. Microorganisms include bacteria, fungi, protozoa, algae and viruses. Some microorganisms are useful in making food like curd and bread, while others cause diseases. They reproduce rapidly and

can survive in extreme conditions. Microorganisms play an important role in maintaining ecological balance.

2. Food preservation is the process of preventing food from spoilage and extending its shelf life. It is necessary because microorganisms grow on food and cause it to spoil. Methods of food preservation include drying, refrigeration, salting, sugaring, pickling and using chemical preservatives. Heating and pasteurisation are also used to kill harmful microorganisms. Proper storage conditions help in maintaining food quality. Therefore, food preservation is important for safe consumption.

3. Bacteria play an important role as friends in many ways. They help in the preparation of curd by converting milk into yoghurt. Some bacteria fix nitrogen in the soil, which increases soil fertility. They are also used in the production of antibiotics and vaccines. Bacteria help in the decomposition of dead organisms, thereby recycling nutrients. They are also used in sewage treatment. Thus, bacteria are useful for both the environment and human life.

Cognitive Corner

HOTS

1. We eat Lactobacillus with yogurt and it is not harmful because it is a beneficial bacterium that helps in digestion and is naturally present in our intestines.
2. A common disease carried by a pet animal is rabies, which is often transmitted by dogs.
3. Leather materials infected by fungi should be kept in sunlight and dry conditions because fungi grow in moist and dark places.
4. Warm conditions are better for converting milk into yogurt because bacteria like Lactobacillus grow faster in warm temperatures.

RESEARCH AND PROJECT

Viruses are unique microorganisms that can only reproduce inside a host cell. They cause diseases such as common cold, influenza and COVID-19. There are limited effective drugs against viruses because they use the host’s cells to multiply. Vaccination is the best way to prevent viral diseases. Research is still ongoing to develop better antiviral medicines.

DO YOURSELF

1. Fill in the blanks

(a) Microscope
(b) Nitrogen
(c) Yeast
(d) Bacteria (Vibrio cholerae)

2. Tick the correct answer

(a) (ii) Alcohol
(b) (ii) Streptomycin
(c) (i) Female Anopheles mosquito
(d) (ii) Housefly
(e) (iii) Growth of yeast cells
(f) (iii) Fermentation

3. Match the following

(i) → (e) Causing cholera
(ii) → (a) Fixing nitrogen
(iii) → (b) Setting of curd
(iv) → (c) Baking of bread
(v) → (d) Causing malaria
(vi) → (f) Causing AIDS

4. Microorganisms cannot be seen with the naked eye and can only be observed with the help of a microscope.

5. The major groups of microorganisms are bacteria, fungi, protozoa, algae and viruses.

6. Microorganisms such as Rhizobium and blue-green algae fix atmospheric nitrogen in the soil.

7. Microorganisms are useful in many ways in our daily life. They help in making curd, bread and alcohol. Some microorganisms are used in the production of antibiotics. They help in nitrogen fixation and increase soil fertility. Microorganisms play an important role in decomposition. They are used in sewage treatment. They help in the preparation of vaccines. Some are used in food preservation. They maintain ecological balance. Thus, microorganisms are very important for life.

8. Some microorganisms cause diseases in humans, animals and plants. They can spoil food and cause food poisoning. They can also damage crops and

reduce agricultural production. Some microorganisms produce toxins that are harmful. Therefore, they can negatively affect health and the economy.

9. Antibiotics are medicines that kill or stop the growth of harmful bacteria. They should be taken only on a doctor's advice and in proper doses. Overuse or misuse of antibiotics can reduce their effectiveness. Antibiotics should not be taken for viral infections. Therefore, proper precautions must be followed while using antibiotics.

Chapter 3: Coal and Petroleum

A. Tick (✓) the correct option

1. (b) Exhaustible natural resources
2. (a) CNG
3. (c) Wood
4. (d) Highest rank

B. Fill in the blanks

1. brown coal
2. roads and paints
3. crude oil
4. lubrication

C. Match the following

1 → (d) Precursor of coal
2 → (b) 20–35% coal
3 → (a) 65–80% coal
4 → (c) 95% coal
5 → (e) Black gold

D. True / False

1. True
2. True

E. Answer the following

Very Short Answer Questions

1. Natural gas mainly consists of methane along with small amounts of ethane, propane and butane.
2. Petroleum refining is the process of separating crude oil into useful fractions by fractional distillation.
3. In India, natural gas fields are located in Tripura, Rajasthan, Maharashtra and the Krishna-Godavari basin.
4. The possible substitution for petrol is CNG or LPG.
5. The top five coal and petroleum producing countries include the USA, Russia, Saudi Arabia, China and India.

Short Answer Questions

1. Coal is used as a fuel for heating and in industries, while petroleum is used for making fuels like petrol, diesel and kerosene as well as products like plastics and chemicals.
2. Exhaustible resources are those that are limited and can be exhausted over time, such as coal and petroleum, whereas inexhaustible resources are unlimited and cannot be depleted, such as sunlight and air.
3. Different types of coal include peat, lignite, bituminous and anthracite. Peat is the lowest quality, lignite is brown coal, bituminous is widely used, and anthracite has the highest carbon content.

Long Answer Questions

1. (a) Petroleum

Petroleum is a fossil fuel formed from the remains of dead organisms buried under the earth for millions of years. It is found between layers of rocks and is extracted by drilling wells. Crude oil is refined by fractional distillation into useful products like petrol, diesel, kerosene and LPG. Petroleum is widely used as a fuel and in industries. It is also used to make plastics, synthetic fibres and chemicals. Since it is a non-renewable resource, it should be used carefully.

(b) Natural Gas

Natural gas is a fossil fuel that is mainly composed of methane. It is found along with petroleum and is trapped between layers of rock. It is transported through pipelines or in compressed form as CNG. Natural gas is a clean fuel that produces less pollution. It is used as a domestic fuel, in vehicles and for power generation. It is also used in industries for making chemicals and fertilizers. Therefore, it is an important energy resource.

(c) Coal

Coal is a fossil fuel formed from dead plants buried under the earth for millions of years. It is obtained through mining. Coal is mainly composed of carbon and is used as a fuel for heating and electricity generation. Different types of coal include peat, lignite, bituminous and anthracite. Coal is also used to make coke, coal tar and coal gas. It is an important but exhaustible natural resource.

2. Biogas

Biogas is a fuel produced by the decomposition of organic waste such as animal dung, plant waste and sewage in the absence of oxygen. It is mainly composed of methane. Biogas is produced in biogas plants. It is used as a clean fuel for cooking and lighting. The leftover slurry is used as manure. Biogas is an eco-friendly and renewable source of energy.

Cognitive Corner

HOTS

Raghu is following more environmentally friendly practices because he uses a solar heater and solar cooker, which use renewable energy and do not cause pollution. In contrast, Amit uses electricity, which may be generated from fossil fuels and can cause pollution. Therefore, renewable energy sources are better for the environment.

Activity Time

Jack can help by conserving petroleum products, such as using public transport, saving electricity and avoiding wastage of fuel. Fossil fuels are depleting because they are limited and used excessively. They can be conserved by using alternative sources of energy like solar and wind energy. PCRA stands for Petroleum Conservation Research Association, which promotes the efficient use of petroleum resources.

DO YOURSELF

1. Advantages of CNG and LPG

CNG and LPG are cleaner fuels that produce less pollution. They have high calorific value and burn efficiently. They are easy to transport and store. Therefore, they are better alternatives to traditional fuels.

2. Bitumen is the petroleum product used for surfacing roads.

3. Coal is formed from dead vegetation over millions of years under high pressure and temperature, and this process is called carbonisation.

4. Fill in the blanks

(a) Coal, petroleum and natural gas
(b) Petroleum refining
(c) CNG

5. True / False

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

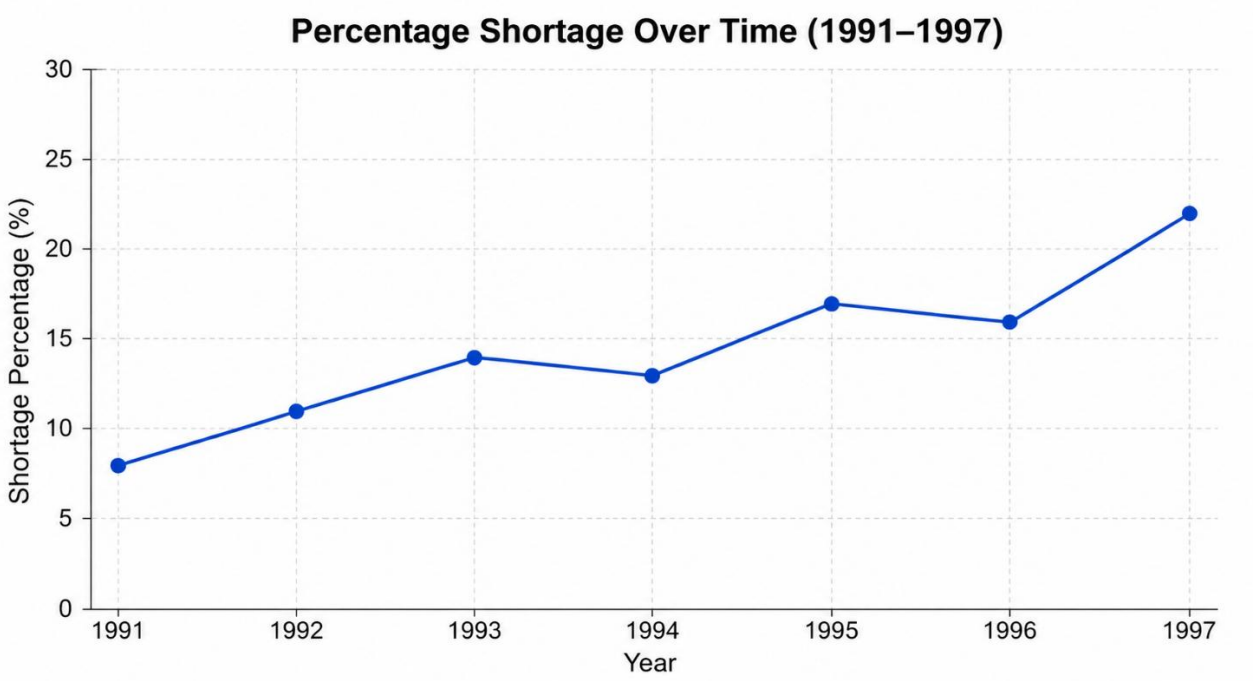
6. Fossil fuels are exhaustible because they are limited in quantity and take millions of years to form. Their continuous use leads to depletion.

7. Coke is a tough, porous and almost pure form of carbon. It is used in the manufacture of steel and as a fuel.

8. Petroleum is formed from the remains of tiny plants and animals buried under the sea millions of years ago. Due to high pressure and temperature, they were converted into petroleum.

9. Graph question (concept answer)

A line graph should be drawn with years on the X-axis and shortage percentage on the Y-axis, showing a gradual increase with fluctuations from 1991 to 1997.



Chapter 4: Combustion and Flame

A. Tick (✓) the correct option

1. (a) Maximum calorific value
2. (b) Gaseous fuel
3. (a) Gaseous fuel
4. (c) Coal

B. Fill in the blanks

1. Outer zone
2. carbon monoxide.
3. calorific value.
4. carbon and hydrogen.

C. Match the following

1 → (e) Low ignition temperature
2 → (a) Supporter of combustion
3 → (c) Cracker explosion
4 → (b) White phosphorus
5 → (d) Cellular respiration

D. True / False

1. True
2. False (Dark zone is the innermost zone)
3. False (A good fuel is not necessarily costly)
4. False (Moderate ignition temperature is desirable)

E. Answer the following

◆ Very Short Answer Questions

1. A solid fuel is a fuel that exists in solid form and produces heat on burning, such as coal and wood.
2. A processed fuel is a fuel obtained after refining or processing natural resources, such as petrol and LPG.
3. A flame is the visible, hot, glowing part of a fire where combustion takes place.
4. An explosion is a sudden reaction in which heat, light, sound and gases are produced rapidly.

◆ Short Answer Questions

1. There are three types of combustion: slow combustion, rapid combustion and spontaneous combustion. Slow combustion occurs slowly without light or flame, rapid combustion produces heat and light quickly, and spontaneous combustion occurs without external ignition.
2. Combustible substances are those that burn in air to produce heat and light, while non-combustible substances do not burn in air.
3. Carbon dioxide extinguishes fire by cutting off the supply of oxygen and lowering the temperature, which stops combustion.

◆ Long Answer Questions

1.

Combustion is the process of burning a substance in the presence of oxygen with the release of heat and light. It requires three conditions: a combustible substance, oxygen and ignition temperature. There are different types of combustion, such as slow, rapid and spontaneous combustion. In slow combustion, heat is produced slowly without flame. Rapid combustion produces heat and light quickly, such as the burning of LPG. Spontaneous combustion occurs without external heat, such as white phosphorus catching fire. Combustion can be complete or incomplete depending on the oxygen supply.

2. A fire extinguisher is a device used to control or put out fire. It works by removing one or more conditions necessary for combustion. Carbon dioxide fire extinguishers release CO_2 gas, which cuts off oxygen supply. Water-based extinguishers lower the temperature of the burning substance. Foam extinguishers form a layer that prevents oxygen from reaching the fire. Different extinguishers are used for different types of fires. Therefore, fire extinguishers are important safety devices.

3. A flame is produced when a combustible substance burns in air. It has three zones: the innermost dark zone, the middle luminous zone and the outer non-luminous zone. The outer zone is the hottest and shows complete combustion. The middle zone is yellow and produces light due to incomplete combustion. The innermost zone contains unburnt vapours. Understanding flame zones helps in the efficient use of fuel.

4. A good fuel has a high calorific value and produces more heat. It should burn easily and produce less smoke and harmful gases. It should be easy to store and transport. It should have a moderate ignition temperature. It should also be economical and readily available. Fuels like LPG and CNG are considered good fuels.

5. Burning of fuels releases gases like carbon dioxide, carbon monoxide and sulphur dioxide. These gases cause air pollution and health problems. Carbon dioxide contributes to global warming. Sulphur dioxide can cause acid rain. Incomplete combustion produces carbon monoxide, which is poisonous. Therefore, burning fuels has harmful effects on the environment.

Cognitive Corner

(HOTS)

1. Electronic equipment like refrigerators and air conditioners release greenhouse gases because they use refrigerants such as CFCs, which contribute to global warming.
2. Doors and windows should be closed during a fire because it cuts off the oxygen supply, which helps in controlling the fire.
3. Fire service personnel should carry different types of fire extinguishers such as CO_2, foam and dry powder extinguishers to handle different kinds of fires like electrical, oil and chemical fires.

Research and Project

A survey can show that LPG is widely used compared to wood and kerosene due to its efficiency and cleanliness. Over the years, the use of LPG has increased while the use of traditional fuels has decreased. Graphs can be plotted to represent this change. This shows a shift towards cleaner fuels.

In the Library

The history of matchsticks shows its development from early chemical matches to modern safety matches. It involves the use of phosphorus and other chemicals. Modern matchsticks are safe and easy to use.

Life Skills

1. Precautions against fire include keeping flammable materials away from fire, using electrical appliances carefully and installing fire extinguishers.
2. Negative effects of combustion can be reduced by using cleaner fuels, avoiding incomplete combustion and reducing fuel consumption.

3.

Fuel	Merits	Demerits
Petrol	High calorific value; burns easily; less residue	Expensive; causes air pollution; non-renewable
Cow dung	Easily available; cheap; eco-friendly; can be used as manure after use	Produces more smoke; low calorific value; less efficient
Wood	Easily available; low cost	Produces smoke and ash; causes deforestation; low efficiency
Coal	High calorific value; long burning	Produces a lot of smoke and harmful gases; causes air pollution

DO YOURSELF

1. Combustion requires a combustible substance, oxygen and ignition temperature.

2. Fill in the blanks

(a) Pollution
(b) LPG
(c) Ignition temperature
(d) Water

3. CNG reduces pollution because it burns completely and produces fewer harmful gases compared to petrol and diesel.

4. LPG is a cleaner fuel that burns completely and produces less smoke, whereas wood produces more smoke and pollutants. LPG has a higher calorific value and is more efficient.

5. Give reasons

(a) Water is not used for electrical fires because it conducts electricity and can cause shock.
(b) LPG is better than wood because it burns cleanly and efficiently.
(c) Paper wrapped around an aluminium pipe does not burn because aluminium conducts heat away, preventing it from reaching ignition temperature.

6. A labelled diagram should show three zones: inner dark zone, middle luminous zone and outer non-luminous zone.

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

8. Carbon dioxide controls fire by cutting off the oxygen supply and reducing the temperature.

9. Green leaves contain moisture and do not catch fire easily, whereas dry leaves catch fire quickly due to lack of moisture.

10. A goldsmith uses the outermost zone because it is the hottest part of the flame.

11.

Calorific value = 180000 ÷ 0.5 = 360000 kJ/kg.

12. Rusting is a slow oxidation process, but it is not considered combustion because it does not produce heat and light.

13. Ramesh's water will heat faster because the outermost zone of the flame is the hottest.

Chapter – 5 : Conservation of Plants and Animals

A. Tick (✓) the correct option

1. (a) International Union for the Conservation of Nature and Natural Resources
2. (a) Karnataka
3. (d) CR (Critically Endangered)
4. (a) Zoological parks
5. (c) Dodo

B. Fill in the blanks

1. the variety of living organisms present on Earth.
2. Kaziranga National Park and Gir National Park. In-situ conservation in their natural habitat.
3. biosphere reserve.

C. Match the following

1 → (c) About to endanger in the world
2 → (e) Southwest India
3 → (b) Generation migration
4 → (d) About to extinct in the world
5 → (a) Gir National Park

D. True / False

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

E. Answer the following

- **Very Short Answer Questions**

1. Endemic species are those species which are found only in a particular area and nowhere else in the world.
2. Five threats to biodiversity are deforestation, habitat loss, pollution, overpopulation and introduction of non-native species.
3. A Red Data Book is a record book that contains information about endangered and threatened species.

◆ Short Answer Questions

1. Definitions

(a) Endangered species are those species that are at high risk of extinction.
(b) Critically endangered species are those species that are on the verge of extinction.
(c) Vulnerable species are those species that are likely to become endangered in the future.
(d) Extinct species are those species that no longer exist on Earth.
(e) Data deficient species are those species about which insufficient information is available.
(f) Endemism is the phenomenon of species being restricted to a particular geographical area.

2. Migration is the movement of animals from one place to another due to seasonal changes, food availability or reproduction. It can be a seasonal migration or a long-distance migration.

3. An ecosystem is a system where living organisms interact with each other and with their physical environment.

◆ Long Answer Questions

1. Biodiversity refers to the variety of living organisms present on Earth. It includes plants, animals and microorganisms. Biodiversity is important for maintaining ecological balance. It is being depleted due to deforestation, pollution, habitat loss, overexploitation and climate change. Conservation methods include in-situ conservation such as national parks and wildlife sanctuaries, and ex-situ conservation such as zoos and botanical gardens. Awareness and strict laws are also necessary to conserve biodiversity.

2. The Red Data Book is a record maintained by IUCN which contains information about endangered and threatened species. It helps in identifying species that need protection. It includes categories like endangered, vulnerable and critically endangered species. It is useful for conservation planning and

awareness. It helps governments and organizations to take proper steps to protect species. Thus, it plays an important role in biodiversity conservation.

Cognitive Corner

(HOTS)

1. Players of New Zealand are called Kiwis because the kiwi bird is an endemic species of New Zealand and represents the country's identity.

Research and Project

A visit to a wildlife sanctuary shows that animals like tigers, elephants and deer are protected. Information such as year of establishment, conservation success and challenges can be collected. This helps in understanding conservation efforts.

Life Skills

Rules in zoo include not feeding animals, maintaining silence and not disturbing wildlife. These rules protect animals and ensure safety of visitors. During safari, instructions include staying inside the vehicle and not making noise to avoid danger.

Speaking Skill

The slogan "Save paper, save trees" means reducing paper usage to prevent cutting of trees and conserve forests.

DO YOURSELF

1. Fill in the blanks

(a) Wildlife sanctuary
(b) Endemic species
(c) Climatic

2.

(a) **Wildlife sanctuary and biosphere reserve**
A wildlife sanctuary protects animals in their natural habitat, while a biosphere reserve protects entire ecosystems, including plants, animals and microorganisms.

(b) **Zoo and wildlife sanctuary**
A zoo keeps animals in artificial conditions, while a wildlife sanctuary protects them in their natural habitat.

(c) **Endangered and extinct species**
Endangered species are at risk of extinction, while extinct species no longer exist.

(d) **Flora and fauna**
Flora refers to plants, while fauna refers to animals.

3. Effects of deforestation

(a) Wild animals lose their habitat and food.
(b) Environment becomes polluted and ecological balance is disturbed.
(c) Villages face soil erosion and reduced rainfall.
(d) Cities experience pollution and climate imbalance.
(e) Earth faces global warming and desertification.
(f) Future generations suffer from loss of biodiversity.

4.

(a) Cutting trees will lead to deforestation and ecological imbalance.
(b) Disturbing habitat will lead to extinction of animals.
(c) Exposed topsoil will result in soil erosion and loss of fertility.

5. Answer in brief

(a) We should conserve biodiversity to maintain ecological balance and ensure survival of future generations.

(b) Protected forests are not completely safe because illegal activities like poaching and deforestation still occur.

(c) Tribal people depend on forests for food, shelter and livelihood.

(d) Deforestation causes soil erosion, global warming, loss of biodiversity and reduced rainfall.

(e) Red Data Book is a record of endangered species used for conservation.

(f) Migration is the seasonal movement of animals from one place to another.

6. Cutting trees is not justified because it leads to environmental imbalance and loss of biodiversity. Sustainable development should be followed.
7. We can contribute by planting trees, saving paper, avoiding plastic and spreading awareness.
8. Deforestation reduces rainfall because fewer trees lead to less transpiration and cloud formation.

9. National parks in a state can be identified and marked on the map for awareness.
10. Paper should be saved to reduce deforestation, and methods include recycling and reusing paper.

Word Puzzle

Across:

1. Extinct
3. Endemic
5. Biodiversity

Down:

1. Endangered
3. Endemic
4. Soil Erosion

Chapter 6 : Reproduction in Animals

A. MCQs

1. **(**c) Euglena
2. (c) Swimming
3. (a) Discharge of sperms

B. Fill in the blanks

1. one nucleus
2. Estrogen and Progesterone
3. Oviduct (fallopian tube)

C. Match the following

1 → (b) Frog
2 → (d) Human beings
3 → (a) Reptiles
4 → (e) Birds
5 → (d) Human beings

D. True / False

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

E. Very Short Answers

1. **Fertilization:** Fusion of male and female gametes
2. **Internal fertilization:** Fusion inside female body
3. **Unisexual organisms:** Male and female organs in different individuals

Short Answer Questions

1. Fertilization is the process in which the male gamete (sperm) fuses with the female gamete (ovum) to form a zygote. This zygote develops into an embryo and later into a new individual.

2. Gestation period is the time interval between fertilization and the birth of a baby. In humans, it is approximately nine months.

Long Answer Questions

1. Asexual reproduction is the process in which a single parent produces offspring without the involvement of gametes. The offspring produced are identical to the parent.
There are different types of asexual reproduction. In binary fission, a single organism divides into two equal parts, as seen in Amoeba. In budding, a small outgrowth develops on the parent body and grows into a new individual, as seen in Hydra. In spore formation, spores are produced that grow into new organisms under suitable conditions, as seen in fungi.

2. Sexual reproduction in humans involves both male and female reproductive systems. The male produces sperms in the testes, while the female produces ova in the ovaries. During fertilization, a sperm fuses with an ovum in the oviduct to form a zygote. The zygote divides repeatedly and develops into an embryo, which gets implanted in the uterus. Over time, the embryo develops into a foetus, and after the gestation period, a baby is born.

3.

(a) Ovulation

Ovulation is the process in which a mature ovum is released from the ovary into the oviduct.

(b) Menstruation

Menstruation is the monthly shedding of the uterine lining along with blood when fertilization does not occur.

(c) Testis

Testis is a male reproductive organ that produces sperms and the hormone testosterone.

(d) Ovary

Ovary is a female reproductive organ that produces ova and secretes female hormones.

COGNITIVE CORNER

HOTS

1. Due to budding, continuous regeneration
2. Due to human activities like deforestation, pollution, and hunting

DO YOURSELF

1. Reproduction is important because it ensures the continuity of a species. It helps in producing new individuals and maintaining the population of living organisms on Earth.

2. Fertilization in human beings is the process in which a sperm fuses with an ovum in the oviduct. This fusion forms a zygote. The zygote divides repeatedly to form an embryo, which gets implanted in the uterus and develops into a foetus.

3. MCQs

(a) (ii) inside female body
(b) (ii) metamorphosis
(c) (iii) two

4. True / False

(a) False
(b) True
(c) True
(d) False
(e) True
(f) False
(g) False
(h) True
(i) True
(j) False

5. A zygote is a single cell formed after fertilisation, whereas a foetus is a later stage of development with well-formed body parts. A zygote is microscopic, while a foetus is visible and more developed.

6. Asexual reproduction is the process in which a single parent produces offspring without the involvement of gametes. In binary fission, an organism divides into two equal parts, as seen in Amoeba. In budding, a new individual develops as an outgrowth on the parent body, as seen in Hydra. In some organisms, reproduction also occurs through spores.

7. The embryo gets embedded in the uterus.

8. Metamorphosis is the process of transformation of a larva into an adult through several stages. Examples include the life cycle of a frog and a butterfly.

9. Internal fertilization takes place inside the female body, as seen in humans. External fertilization takes place outside the body, usually in water, as seen in frogs.

10. Crossword puzzle

Down:

1. Fertilization
6. Internal
7. Buds
8. Ovary

Across:
2. Testes
3. IVF
4. Oviparous
5. Binary fission

Chapter 7: Reaching the Age of Adolescence

A. Tick (✓) the correct option

1. (c) Secondary sexual characters
2. (a) XX
3. (a) Ovulation
4. (b) Chapatti, dal, vegetables

B. Fill in the blanks

1. Puberty is the period of onset of **sexual** maturity in humans.
2. **Endocrine** glands release hormones directly into the bloodstream.
3. **Testosterone** regulates sperm production in males.
4. Ants secrete hormonal substances called **pheromones** from their bodies.
5. It is very important for adolescents to have a **balanced** and **nutritious** diet.

C. Match the following

1 → (d) Plays important role in body's immune system
2 → (c) Master gland
3 → (e) Deficiency causes diabetes
4 → (b) Deficiency causes cretinism and goitre
5 → (a) Stress hormone

D. True / False

1. True

2. True
3. False (Males have XY chromosomes)
4. True
5. True

E.

1. **Insulin** – because it is not a sex hormone.
2. **Economic growth** – because it is not related to adolescent development.
3. **Goitre** – because it is a disease, not a body structure.
4. **Menopause** – because it marks the end, not part of the menstrual cycle.

F. Answer the following

- **Very Short Answer**

1. Adolescence is the period of transition from childhood to adulthood, while puberty is the stage when sexual maturity begins.
2. The most noticeable change during puberty is the rapid increase in height.
3. During puberty, the voice box in males enlarges and the voice becomes deep.
4. Hormones are chemical substances secreted by endocrine glands that control body functions.

- **Short Answer Questions**

1. The secretions of endocrine glands are called hormones. These hormones regulate growth, development and various body functions.

2. Puberty is the stage when a child attains sexual maturity, whereas adolescence is the overall period of physical and mental development from childhood to adulthood.

3. The sex of a baby is determined by the father. If the sperm carries X chromosome, the baby is female (XX), and if it carries Y chromosome, the baby is male (XY).

4. During puberty, there is increase in height, development of secondary sexual characters, change in voice, growth of hair and maturation of reproductive organs.

5. Adam's apple is the protruding part of the voice box in boys, which becomes prominent during puberty.

- **Long Answer Questions**

1. Endocrine glands are ductless glands that release hormones directly into the bloodstream. Important glands include the pituitary gland (growth hormone), thyroid gland (thyroxine), pancreas (insulin), adrenal gland (adrenaline) and sex glands (testosterone, estrogen). These hormones regulate growth, metabolism and reproduction.

2. Sex hormones are chemical substances that control the development of secondary sexual characteristics. Testosterone is the male hormone responsible for the development of male features, while estrogen controls female characteristics. They also regulate reproductive functions.

3. Menarche is the beginning of menstruation in females at puberty, while menopause is the stage when menstruation stops permanently.

4. Secondary sexual characters are physical features that distinguish males and females, such as a beard and deep voice in males, and breast development in females.

Questions

1. If a person does not take iodised salt, it can lead to iodine deficiency, causing goitre and improper growth.

2. Acne and pimples appear during adolescence due to increased activity of sebaceous glands caused by hormonal changes.

DO YOURSELF

1. Chemical secretions of endocrine glands are called hormones.

2. Adolescence is the stage between childhood and adulthood marked by rapid physical and mental changes.

3. Menstruation is the monthly shedding of the uterine lining in females when fertilization does not occur

4. The body shows rapid growth, development of reproductive organs, hair growth, voice change and emotional development.

5.

- Pituitary → Growth hormone
- Thyroid → Thyroxine
- Pancreas → Insulin
- Adrenal → Adrenaline
- Testes → Testosterone
- Ovaries → Estrogen

6. Sex hormones control reproductive functions and the development of secondary sexual characteristics.

7.

(a) (ii) Proper diet is needed for rapid growth
(b) (i) Menstruation starts
(c) (ii) Chapati, dal, vegetables

8.

(a) Adam's apple: It is the enlarged voice box in males visible as a protrusion in the throat.

(b) Secondary sexual characters: These are features like facial hair in males and breast development in females.

(c) Sex determination: The father determines the sex of the child through X or Y chromosome in sperm.

Word Game

Across:
3. Adam's apple
4. Endocrine
7. Pituitary
8. Ovary
9. Acne
10. Ovaries

Down:

1. Testosterone
2. Thyroid
3. Adolescence

5. Target site

6. Larynx

7. Puberty

Graph Conclusion

From the graph, it is concluded that girls grow faster than boys in early adolescence, but boys eventually grow taller than girls in later years.

Chapter 8: Force and Pressure

A. Tick (✓) the correct option

1. (a) newton
2. (b) Non-contact force
3. (a) Friction
4. (c) Area
5. (c) 1 kgf = 9.8 N

B. Fill in the blanks

1. motion and change
2. push or pull
3. repel each other
4. gravity
5. force acting per unit area

C. Match the following

1 → (e) Pascal
2 → (a) $F = F_1 + F_2 + F_3$
3 → (b) F = Zero
4 → (c) In all directions
5 → (d) Measurement of liquid pressure

D. True / False

1. False (Barometer measures atmospheric pressure, not liquid pressure)
2. True
3. True
4. True

E. Answer the following

- **Very Short Answer**

1. A manometer is an instrument used to measure the pressure of liquids or gases.
2. Resultant force is the net force acting on an object when two or more forces act on it.
3. Examples include cutting with a knife, drinking through a straw, inflation of tyres, flow of water in pipes and pressing toothpaste from a tube.
4. The coaster sticks due to atmospheric pressure acting on it when the glass is inverted.

- **Short Answer Questions**

1. Friction can be reduced by polishing surfaces, using lubricants like oil or grease, and using ball bearings.

2. Solids exert pressure because they apply force on a surface, and this pressure depends on the area of contact.

3. Yes, fluids exert pressure in all directions, and this pressure increases with depth.

4. When a body leaves the earth, it experiences reduced gravitational force and becomes nearly weightless.

- **Long Answer Questions**

1.

Force is a push or pull that can change the state of motion, shape or direction of an object. It can be contact forces like muscular and frictional force, or non-contact forces like gravitational, magnetic and electrostatic force. The SI unit of force is newton.

2. Pressure is defined as force acting per unit area. Its SI unit is pascal. Pressure increases when force increases and decreases when area increases. Liquids and gases exert pressure in all directions.

3. A spring balance measures force or weight. It works on the principle that the extension of a spring is proportional to the applied force.

Cognitive Corner

HOTS

1. Astronauts wear special suits because there is no air pressure in space, so the suit provides necessary pressure and oxygen.
2. Trucks have more tyres to increase the area of contact, which reduces pressure on the ground.

DO YOURSELF

1. Pushing a door and pulling a rope are examples where force changes motion.

2. Pressing a sponge or stretching a rubber band changes the shape of an object.

3. Fill in the blanks**

(a) pull
(b) attracts
(c) push
(d) repels

4.

(a) shape
(b) muscular
(c) contact
(d) gravity and friction

5.

(a) Agent: Fingers; Object: Lemon; Effect: Shape changes and juice comes out.
(b) Agent: Hand; Object: Toothpaste tube; Effect: Paste comes out.
(c) Agent: Load; Object: Spring; Effect: Spring stretches.
(d) Agent: Athlete’s muscles; Object: Body; Effect: Body moves upward.

6. Hammering changes the shape of iron by applying force.

7. Electrostatic force is responsible for the attraction between the balloon and the wall.

8. Gravitational force acts downward, and muscular force acts upward, so the forces balance and no motion occurs.

9. Gravitational force and thrust force act on the rocket.

10. (d) atmospheric pressure

Chapter 9: Friction

A. Tick (✓) the correct option

1. (b) maximum
2. (d) gases and liquids
3. (a) maximum value of static friction
4. (b) reduce
5. (a) Running

B. Fill in the blanks

1. opposite
2. irregularities (roughness) of surfaces.
3. stationary

C. Match the following

1 → (e) Maximum friction
2 → (b) Between rolling objects
3 → (a) Viscous fluids
4 → (c) Between static objects
5 → (d) Between sliding surfaces

D. True / False

1. False
2. True

3. False

E. Answer the following

- **Very Short Answer**

1. Friction is the force that opposes the relative motion between two surfaces in contact, and it is a contact force.
2. Soap solution reduces friction by making surfaces smooth and slippery, so the ring comes out easily.
3. A baller rubs hands with dust to increase friction and get a better grip on the ball.

- **Short Answer Questions**

1. Friction helps us to walk without slipping and allows us to write on paper.

2. Friction causes wear and tear of machines, produces unwanted heat and reduces the efficiency of devices.

3. A boat is made streamlined to reduce fluid friction (water resistance). This shape allows water to flow smoothly around the boat, helping it move faster and use less energy (fuel).

4. Friction does not depend on the surface area of contact between two surfaces. It mainly depends on the nature of surfaces (rough or smooth) and the force pressing them together.

- **Long Answer Questions**

1. Friction is a force that resists motion between two surfaces in contact. It is caused by irregularities on surfaces. Types of friction are static friction, sliding friction, rolling friction and fluid friction.

2. Friction can be reduced by using lubricants, polishing surfaces, using ball bearings and making objects streamlined.

3.

(a) **Rolling friction:**
Rolling friction occurs when an object rolls over a surface and it is the least among all types of friction.

(b) **Fluid friction:**
Fluid friction is the resistance offered by fluids like air or water to moving objects.

(c) **Sliding friction:**
Sliding friction acts when one surface slides over another.

(d) **Static friction:**
Static friction acts when objects are at rest and prevents motion.

4. Friction is necessary because it helps in walking, writing, gripping objects and stopping vehicles. Increased friction is required in brakes, tyres and shoe soles.

Cognitive Corner

HOTS

1. Friction can never be zero because surfaces always have some irregularities.
2. If there is no friction, a moving object will never stop and it will be impossible to walk or hold objects.
3. The invention of the wheel is important because it converts sliding friction into rolling friction, which is much less.

RESEARCH AND PROJECT

Aim:

To study factors affecting friction.

Conclusion

- Friction increases with the weight (mass) of the object.
- Friction depends on the nature of the surface (rough > smooth).
- Friction is less on smooth surfaces (glass) and more on rough surfaces (wood).

So, smoother surface = less friction, heavier object = more friction.

IN THE LIBRARY

Friction depends on the weight of the object and nature of surfaces, not on surface area.

Coefficient of friction:
It is a measure that tells how much friction exists between two surfaces.

LIFE SKILLS

Friction is called a *necessary evil* because:

Necessary:

- Helps us walk without slipping
- Helps in writing with pencil/pen
- Helps vehicles move and stop

Harmful:

- Causes wear and tear of machines
- Produces heat (energy loss)
- Slows down motion

So, friction is both useful and harmful.

DO YOURSELF

1. Fill in the blanks

(a) relative motion
(b) nature (roughness)
(c) heat
(d) reduces
(e) less

2. (c) Static, sliding, rolling

3. (a) wet marble floor → dry marble floor → newspaper → towel

4. Friction acts upward along the surface, opposite to the direction of sliding.

5. It makes the floor slippery by reducing friction, so walking becomes difficult.

6. Spikes increase friction and provide better grip.

7. Seema will apply more force because heavier objects have greater friction.

8. Sliding friction is less than static friction because less interlocking of surfaces occurs during motion.

9. Friction helps in walking and writing, but causes wear and tear and heat loss.

10. Objects moving in fluids are given streamlined shapes to reduce fluid friction.

Chapter 10: Sound

A. Tick (✓) the correct option

1. (d) vacuum
2. (b) speaking
3. (a) lady
4. (d) solids

B. Fill in the blanks

1. Vibration
2. Phonation
3. eardrum (tympanum).

C. Match the following

1 → (d) dB
2 → (a) 20 to 20,000 Hz
3 → (b) Shrill voice
4 → (c) Heavy voice
5 → (e) Nerve cell vibrations

D. True / False

1. True
2. True
3. False

E. Answer the following

Very Short Answer

1. Amplitude is the maximum displacement of a vibrating body from its mean position.

2. Frequency is the number of vibrations per second.
3. Time period is the time taken to complete one vibration.
4. Oscillation is one complete to-and-fro motion of a body about its mean position.
5. Infrasonics have a frequency below 20 Hz, while ultrasonics have a frequency above 20,000 Hz.

- **Short Answer Questions**

1. Sound is a form of energy produced by vibrations and perceived by our ears.

2. Audible sounds are those between 20 Hz to 20,000 Hz that humans can hear, while sounds outside this range are inaudible.

3. Echoes are useful in SONAR, measuring the distance and depth of the sea, and detecting objects.

4. Quality of sound is the characteristic that helps us distinguish between sounds of the same pitch and loudness but from different sources.

- **Long Answer Questions**

1. Sound is produced due to vibrations of objects. It propagates through a medium like air, liquid or solid but cannot travel in vacuum.

2. Sound is produced in humans by vibration of vocal cords in the larynx. It is detected by ears where sound waves are converted into signals and sent to the brain.

3.

(a) Loud sound:
Loudness depends on amplitude; greater amplitude produces a louder sound.

(b) Pitched sound:
Pitch depends on frequency; a higher frequency produces a shrill sound.

4. Quality depends on the waveform and helps identify the source of sound.

Cognitive Corner

HOTS

1. SONAR is used in oceanography to measure depth and locate objects underwater.
2. No, sound cannot be heard in space because there is no medium.
3. Sound cannot travel such long distances effectively due to energy loss and obstacles.
4. No, not every vibration produces audible sound; only vibrations within audible range do.

IN THE LIBRARY

1.

SONAR is a technique that uses sound waves to measure distance and depth in water.

Principle:

- Sound waves travel in water, reflect from objects, and return as echoes.
- The time taken by the echo is used to calculate distance.

Formula:
Distance = (Speed of sound × Time) ÷ 2

Uses:

- Measuring depth of oceans (echo sounding)
- Detecting submarines and underwater objects
- Locating fish and obstacles in sea

2. Acoustics is the science of how sound behaves in a closed space like an auditorium or hall.

Key points:

- Proper design reduces echo and reverberation
- Walls and ceilings use sound-absorbing materials
- Ensures clear and loud sound reaches the audience

RESEARCH AND PROJECT

1. Project: Noise Pollution – Causes and Prevention

Causes:

- Vehicle horns and traffic
- Loudspeakers and music systems
- Construction work
- Industrial machines

Effects:

- Hearing loss
- Stress and irritation
- Sleep disturbance
- Health problems

Prevention:

- Avoid unnecessary honking
- Use soundproofing in buildings
- Follow noise control laws
- Plant more trees (reduce sound)

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2. Water Bottle Jaltarang (Activity)

Materials Required:

- 6 glass bottles
- Water
- Spoon
- Marker

Procedure:

1. Fill bottles with different levels of water
2. Tap bottles gently with a spoon
3. Listen to different sounds produced

Observation:

- Less water → **higher pitch**
- More water → **lower pitch**

Conclusion:

Sound depends on vibrations and the amount of water, which affects pitch.

DO YOURSELF

1. (d) air, liquids and solids
2. (c) A man
3. True / False

(a) True
(b) False
(c) False
(d) True
(e) False
(f) False
(g) True

4. Fill in the blanks

(a) time period
(b) amplitude
(c) hertz (Hz)
(d) noise
(e) frequency

5. Formula Used

$$\textbf{Frequency (f)} = \frac{\textbf{1}}{\textbf{Time Period (T)}}$$

$$\textbf{Time Period (T)} = \frac{\textbf{1}}{\textbf{Frequency (f)}}$$

Given:

Time period $T = \frac{1}{40}\ s$

$$T = 0.025\ s$$

Now,

$$f = \frac{1}{T} = \frac{1}{0.025} = 40\ Hz$$

- **Time period = 0.025 s**
- **Frequency = 40 Hz**

6.

Given:
Time period $T = \frac{1}{500}\ s$

$$T = 0.002\ s$$

Now,

$$f = \frac{1}{T} = \frac{1}{0.002} = 500\ Hz$$

Time period = 1/40 s = 0.025 s
Frequency = 40 Hz

7. (a) Dholak → membrane
(b) Sitar → strings
(c) Flute → air column

8. Noise is an unpleasant sound, while music is a pleasant sound. Yes, music can become noise if it is too loud.

9. Vehicles, factories, loudspeakers, and construction work**.**

10. Causes hearing loss, stress, headache and sleep disturbance.

11. A house away from the roadside is better because it has less noise pollution.

12. The larynx produces sound through the vibration of the vocal cords.

13. Light travels faster than sound, so lightning is seen first and thunder is heard later.

Chapter 11: Chemical Effects of Electric Current

A. Tick (✓) the correct option

1. (a) 0 A
   (Distilled water does not conduct electricity)
2. (d) Both (a) and (b)
   (Ammonium chloride + Zinc chloride)
3. (d) Pure water

B. Fill in the blanks

1. the chemical decomposition of a substance by passing electric current through it.
2. Electroplating
3. good
4. heating, magnetic and chemical

C. Match the following

1 → (d) Negative electrode
2 → (b) Positive electrode
3 → (e) Lemon juice
4 → (a) Positive ions
5 → (c) Negative ions

D. True / False

1. True
2. False

E. Answer the following

◆ Very Short Answer

1. Electrolysis is the process of chemical decomposition of a substance using an electric current.
2. Conducting power of a conductor is its ability to allow an electric current to pass through it.

🔹 Short Answer Questions

1. Electrolysis helps in refining metals by removing impurities and depositing pure metal on the electrode.

2. When electric current passes through a conductor, heat is produced due to resistance. This is called the heating effect of current.

🔹 Long Answer Questions

1. Electroplating is the process of coating one metal with another using electric current. It is needed to prevent corrosion, improve appearance and increase the durability of objects.

2. The bulb does not glow because pure water is a poor conductor and does not have enough ions to carry current.

F. The liquid in which the bulb glows brighter is the better conductor. Generally, lemon juice is a better conductor due to its higher acidity.

Cognitive Corner

HOTS

1. Potatoes conduct electricity weakly due to the presence of ions.
2. Salt solution conducts because it forms ions, while solid salt does not conduct as ions are not free.
3. Firemen switch off electricity because water can conduct current and may cause an electric shock.

PROJECT (Electroplating – PPT Content)

Electroplating is the process of coating a metal object with a thin layer of another metal using electricity.

Uses in Industries:

- Jewellery: Gold/silver plating on ornaments
- Automobile: Chromium plating on car parts (prevents rust, gives shine)
- Food industry: Tin plating on cans (prevents corrosion)
- Electronics: Protects components from damage

Chromium Electroplating:

- Used on taps, car parts, bicycle handles
- Makes objects shiny, corrosion-resistant, and durable

Adverse Health Effects:

- Chemicals used can be toxic
- May cause skin irritation and breathing problems
- Pollutes water and soil if waste is not treated

IN THE LIBRARY (Electric Cell)

Aim:

To make a simple electric cell

Conclusion:

- The bulb glows because the solution conducts electricity
- Salt/acid solutions conduct electricity due to ions
- Sugar solution does not conduct (no ions formed)

So, conduction in liquids depends on the presence of ions

DO YOURSELF

1. **Fill in the blanks**

(a) acids, bases and salts
(b) chemical
(c) negative
(d) electroplating

2. The magnetic needle deflects because an electric current produces a magnetic effect.

3. Salt solution, lemon juice and vinegar.

4. Possible reasons: weak current, poor conductor, loose connections or insufficient voltage.

5. (i) Liquid A is a better conductor than liquid B.

6. Pure water does not conduct; adding salt makes it conductive.

7. Water conducts electricity, so power is cut to avoid shock.

8. Seawater has more salts → more ions → better conductor.

9. Not safe because water conducts electricity and increases the risk of shock.

10. Rainwater contains dissolved impurities, so it conducts electricity.

11. Examples: taps, jewellery, car parts, utensils.

12.

Impure copper rod → positive terminal (anode)
Pure copper plate → negative terminal (cathode)
Because copper deposits on the cathode.

Chapter 12: Some Natural Phenomena

A. Tick (✓) the correct option

1. (a) earthquake
2. (a) located on the earth's surface
3. (a) tectonic
4. (a) earthquakes
5. (b) until they both carry the same charge
6. (a) they acquire equal and opposite charge

B. Fill in the blanks

1. Richter scale
2. Tsunami
3. Charles F. Richter.
4. 10 (approx.).
5. Electroscope

C. Match the following

1 → (e) Determine the magnitude of the earthquake
2 → (—) Crust → outermost layer *(not perfectly aligned in given options)*
3 → (a) Weaker boundaries of tectonic plates
4 → (c) Nickel and iron

5 → (b) Seismograph
6 → (d) Attract each other

D. True / False

1. True
2. True
3. True

E. Very Short Answer Questions

1. A seismic zone is a region prone to earthquakes.
2. An earthquake is the sudden shaking of the earth's surface.
3. Magnitude of an earthquake is the measure of its energy released.
4. Squat position is sitting low with knees bent and head down for safety.
5. Most disastrous lightning/strike varies (example: lightning deaths in India during monsoon).
6. States like Jammu & Kashmir, Himachal Pradesh, Uttarakhand, Bihar and North-East states are earthquake-prone due to tectonic plate boundaries.

G. Short Answer Questions

1. Seismology is the study of earthquakes.

2. Four layers of Earth

Crust, Mantle, Outer core and Inner core.

3. India is divided into seismic zones based on earthquake risk (Zone II to V).

4. They are installed as lightning conductors to safely transfer charge to the ground.

5. Earthing is the process of transferring excess charge to the earth to prevent electric shock.

6. A body can be charged by friction, conduction and induction.

Long Answer Questions

1. An earthquake is a sudden shaking of the Earth's crust caused by the movement of tectonic plates. Terms include focus, epicentre, seismic waves and magnitude.

2. Earthquakes are caused by the sudden movement or collision of tectonic plates, releasing energy.

3. Richter scale measures the magnitude of an earthquake on a scale from 0 to 10. Each increase represents 10 times more energy.

4. Stay calm, take cover under a table, stay away from windows, move to an open area if outside and avoid lifts.

5. Lightning occurs due to the accumulation of charges in clouds, which discharge suddenly to the earth or between clouds.

Cognitive Corner

(HOTS)

1. Tall trees
Reason: Lightning strikes the highest point as it offers the easiest path to the ground.

2. Figure missing

RESEARCH AND PROJECT

1. Making a Simple Electroscope

Aim:

To detect electric charge on objects.

Materials:

Glass bottle, rubber cork, copper wire, aluminium foil

Procedure (short):

- Insert copper wire through cork
- Attach aluminium foil leaves inside
- Fix foil ball outside
- Bring charged object near

Observation:

Leaves **move apart**

Conclusion:

- Object is charged

- Leaves get **same charge → repel**

2. Seismograph (Project Content)

What is Seismograph?

An instrument used to detect and record earthquakes.

Construction:

- Heavy mass suspended with spring
- Pen attached to mass
- Rotating drum with paper

Working:

- During earthquake, ground moves
- Drum moves but mass stays almost still
- Pen records waves → seismic graph

IN THE LIBRARY

Van de Graaff Generator

What is it?

A machine that produces very high voltage (static electricity).

Construction:

- Moving belt
- Metal sphere (dome)
- Rollers

Working:

- Belt carries charges upward
- Charges accumulate on metal sphere
- Voltage increases to thousands of volts

Uses:

- Physics experiments

- Particle acceleration
- Demonstrating static electricity

GROUP DISCUSSION

Precautions during an earthquake

- Drop, cover, and hold
- Stay away from windows and heavy objects
- Do not use lifts
- Move to open area if outside
- Switch off gas and electricity
- Stay calm and alert

DO YOURSELF

1. (b) A copper rod
2. (b) becomes positively charged while the cloth acquires a negative charge

3. **True / False**

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

4. A crackling sound is due to the sudden discharge of static electricity.
5. A charged body loses charge when touched due to earthing through the human body.
6. Richter scale; magnitude 3 can be recorded but causes very little damage.
7. Stay indoors, avoid tall trees, and do not use metal objects.
8. As charges repel and unlike charges attract due to the electrostatic force.
9. An electroscope is used to detect charge.
10. States: Jammu & Kashmir, Uttarakhand, Assam.
11. Move to open ground away from buildings and trees.
12. No, an umbrella should not be used as it may attract lightning.

Chapter 13: Light

A. Tick (✓) the correct option

1. **(a)** Cones
2. (d) both (a) and (c) *(diffused + regular depending on surface finish)*
3. (a) Always true

B. Fill in the blanks

1. Image of the object persists on the retina of the eye for **1/16** of a second.
2. **Ciliary muscles** change the size of the convex lens.
3. Multiple reflections can generate **many images**.
4. Lateral inversion is a **sidewise reversal**.

C. Match the following

1 → (a) Real image
2 → (e) Irregular reflection
3 → (c) Control the amount of light entering the eye
4 → (b) Eye defect
5 → (d) Regular reflection

D. True / False

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

E. Very Short Answers

1. Myopia is a defect in which a person cannot see distant objects clearly.
2. Light enables us to see.

Short Answer Questions

1. The angle of incidence is equal to the angle of reflection, and the incident ray, reflected ray and normal lie in the same plane.

2. Kaleidoscope and periscope are common applications of multiple reflections.

Long Answer Questions

1.A kaleidoscope is an optical instrument consisting of mirrors placed at angles inside a tube. It produces beautiful patterns due to multiple reflections of light.

2. The human eye is a sense organ that helps us see. Light enters through the cornea, passes through the pupil, and is focused by the lens on the retina. The retina forms a real, inverted image which is interpreted by the brain.

Cognitive Corner

HOTS

1. No, green light will not undergo dispersion because it is a single colour.
2. Water bucket appears deeper because water has higher optical density than kerosene.

RESEARCH AND PROJECT

Principle:

Based on **multiple reflection of light**

Conclusion:

Light reflects from two mirrors at **45°**, allowing us to see objects not in direct line of sight (like in submarines).

IN THE LIBRARY

Theories of Light

- Newton's Corpuscular Theory: Light is made of particles
- Huygens' Wave Theory: Light behaves like waves
- Maxwell's Theory: Light is an electromagnetic wave

- Einstein’s Quantum Theory: Light has particle nature (photons)

DO YOURSELF

1. No, we cannot see objects in a dark room because light is necessary for vision.

2. Regular reflection occurs from smooth surfaces, while diffused reflection occurs from rough surfaces. Diffused reflection does not violate laws of reflection.

Q3

(a) Polished wooden table → Regular reflection
(b) Chalk powder → Diffused reflection
(c) Cardboard surface → Diffused reflection
(d) Marble with water → Regular reflection

Q4. Laws of reflection: angle of incidence = angle of reflection; all rays lie in same plane.

Q5. Do it yourself.

Q6. Fill in blanks

(a) 1 m
(b) left, right
(c) large
(d) less

Q7

(a) Always

Q8

(b) virtual, behind the mirror and of the same size as the object

Q9

Kaleidoscope is constructed using three mirrors placed at angles inside a tube.

Q10

Laser torch can harm the eyes, so it should not be used directly.

Q11

Take care of eyes by proper lighting, balanced diet and avoiding strain.

Q12

Angle of incidence = 45° *(since reflected ray is 90° total angle)*

Q13

Infinite images are formed between two parallel mirrors.

Q14

Ray will reflect from the second mirror following laws of reflection (angle remains the same).

Q15Boojho can see himself if within the field of view; visibility depends on the mirror position.

Q16

(a) Image is formed behind the mirror at equal distance.
(b) Yes
(c) No
(d) Image position remains unchanged