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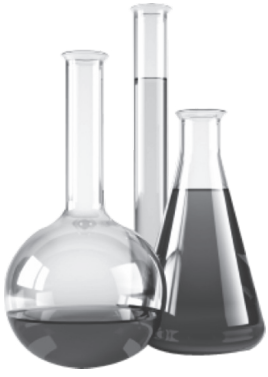
NEW VISION OF SCIENCE

Teachers Manual



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NEW VISION OF SCIENCE - 6

CHAPTER : 1 – FOOD : WHERE DOES IT COME FROM

A. 1. c, 2. b, 3. c, 4. c, 5. b, 6. c, 7. d, 8. d, **B.** 1. food, 2. producers, 3. sugar, 4. Eggs, 5. herbivores, 6. edible, 7. Wheat, 8. Oils, **C.** 1. T, 2. F, 3. T, 4. F, 5. T, 6. F, 7. T, 8. T, **D.** 1. a, 2. c, 3. h, 4. b, 5. d, 6. e, 7. g, 8. f, **E.** 1. Photosynthesis, 2. Wheat flour, 3. Honey, 4. Dairy products, 5. Butter, 6. Vegetarians, 7. Scavengers, 8. Omivores, **F. 1.** The material or substance which we eat is called food. **2.** Cereals such as wheat, rice, maize, oat, etc., are energy-rich grains, obtained from grasses. They are rich in carbohydrates along with some proteins, vitamins and minerals. **3.** Green plants are known as producers. All other living organisms that depend on plants for their food are called consumers. **4.** a. Egg–Hen, b. Milk–Cow, **5.** Animals which eat only plants or plant products are called Herbivores. e.g. cow, deer, **6.** Animals which eat only flesh are called Carnivores. e.g. eagle and lizard. **7.** Tea, coffee and cocoa are beverages. Leaves of tea plant are dried, processed and than used to make tea. Coffee beans are ground to make coffee powder. Cocoa beans are used to make chocolate. **8.** Food is essential for the existence of all living things. A food chain shows how plants, animals and humans are dependent on each other for their food. It shows the interdependence of organisms on each other. **G. 1.** We need food for growth and development, to get energy to carry out different functions, for repair and maintenance of body and to fight against diseases. **2.** Different living things prefer different kind of food. For example, some human beings prefer to eat plant food such as fruits, vegetables, cereals, etc. Some human beings prefer to eat animal food such as eggs, meat, milk, etc. While some prefer to eat both plant and animal food. Some animals eat plant parts and grasses such as cow, goat, etc. Some animals eat flesh of other animals such as tiger, lion, etc. While some animals eat both plant parts and flesh of animals such as bear, crow etc. **3.** Vegetables include roots, stems, leaves and fruits of different plants. **Roots we eat as vegetables :** Radish, Beetroot, Carrot, Turnip, **Stems we eat as vegetables:** Potato, Onion, Ginger, Garlic, **Leaves we eat as vegetables:** Lettuce, Methi/fenugreek, Cabbage, Basil, **Fruits we eat as vegetables:** Apple, Bananas, Cucumber, Mango. **4. Ingredients:** Pizza–Wheat flour, Idli–Rice flour, Dosa–Paddy rice and Samosa–wheat flour and vegetables. **5. Herbivores** eat only plants products, e.g., cow, goat, deer. **Carnivores** eat only flesh of other animals, e.g., lion, tiger, snake, etc. **Omnivores** eat both plants and animals. For example, dog, cat,

humans, etc. **6.** Humans and animals can be divided into the following categories based on their eating habits. **Herbivores:** Animals which eat only plants or plant products are called Herbivores. Cow, Deer, Camel and Goat are some examples of Herbivores. **Carnivores:** Animals which eat only flesh are called Carnivores. Some examples of Carnivores are Lion, Tiger, Snake, Eagle and Lizard. Some animals like Vultures and Hyenas eat remains of dead animals. They are called **Scavengers. Omnivores:** Omnivores are those organisms which eat both plants and animals. Dog, Cat, Crow and Bear are some examples of Omnivores. Most humans who eat meat are also Omnivores. **7.** The plants parts which are eaten are called edible parts. For examples,

Root — Radish, Beetroot, Carrot, Turnip
Stems — Potato, Onion, Ginger, Garlic
Leaves — Lettuce, Methi, Cabbage, Basil
Fruits — Apple, Bananas, Cucumber, Mango
Seeds — Kidney beans, Green mung, Wheat gains, Cumin seeds

8. Vegetarians: People who eat only plant products or part of plant are called vegetarians.

Non-Vegetarians : People who eat plant products as well as animals products like fish, meat, etc., are called non-vegetarians. **HOTS :** A is cow which gives milk, B is hen which gives eggs.

CHAPTER : 2 – COMPONENTS OF FOOD

A. 1. c, 2. c, 3. c, 4. c, 5. b, 6. a, 7. b, 8. c, **B.** 1. Sugar and Starch, 2. Cellulose, 3. proteins, 4. Vitamins, 5. water, 6. diet, 7. Calcium, 8. deficiency diseases, **C.** 1. F, 2. T, 3. F, 4. F, 5. T, 6. T, 7. T, 8. F, **D.** 1. c, 2. d, 3. f, 4. a, 5. b, 6. h, 7. e, 8. g, **E.** 1. Balanced Diet, 2. Protein, 3. Vitamin A, 4. Deficiency Diseases, 5. Iodine, 6. Starch, 7. Iodine, 8. Obesity, **F. 1.** Energy-giving foods, Body-building foods, Protective foods, **2.** Fats are energy giving food components and make the body strong. These protect internal organs against shock and also contain many important hormones to regulate our body activities. **3.** A diet which contains all nutrients in proper amount and proportion as required by our body for normal growth and functioning is called balanced diet. **4.** The chemical substances present in our food that provide the nourishment needed for the growth and development of our body are called nutrients. **5.** Lack of any of the nutrients, can cause abnormalities and diseases. These are called deficiency diseases. **6.** (i) Sugar-fruits, honey, milk (ii) Starch–wheat, potato, bread. **7.** People, who do not get sufficient food to eat, become weak

and suffer from disorders; their normal health is affected. Such a condition is called malnutrition. **G. 1.** Proteins are needed by our body for muscle building and repairing worn-out tissues (these are compounds of carbon, hydrogen, oxygen and nitrogen). Our muscles, organs and even blood are made up of costly proteins. If we do not eat proteins, our body will not be able to repair damaged cells or build new cells. Proteins in our diet come from animal and plant sources. **Animal Sources–**meat, fish, egg, milk, etc. **Plant Sources–**pulse, soyabeans, grains, nuts, etc. **2.** Vitamins are of two kinds: (i) Water soluble, (ii) Fat soluble. Vitamins B1, B2, B3, B6, B12 and folic acid and vitamin C are water soluble vitamins. Vitamins A, D, E and K are fat soluble vitamins. **Vitamin A:** Promotes growth, help normal night vision, **Vitamin D:** Aids normal growth of bones and teeth, **Vitamin E:** Aids normal reproduction, **Vitamin K:** Necessary for proper clotting of blood from any injury, **Vitamin B1 :** Necessary for growth, essential during lactation and pregnancy, **Vitamin B2:** Improves growth and general health; essential for reproduction, lactation and respiration, **Vitamin B2 (folic acid):** Helps formation and maturation of red blood cells, **Vitamin B12:**Improves growth and general health; essential for reproduction, lactation and respiration, **Vitamin C:** Helps formation and maturation of red blood cells. **3. (a) Vitamin B1:** (Beri beri)–Swelling and pain in legs, Dizziness, Palpitation, Loss of appetite, Weak muscles and very little energy to work, **(b) Vitamin B2** (folic acid)**: (**Anaemia)–Fatigue, Stress related disorders, Soreness of the tongue, Cracking of the corners of the mouth **(c) Vitamin C:** (Scurvy)–Swelling and bleedings of gums, Poor resistance to cold **d) Iodine:** Abnormal growth of thyroid gland, abnormal metabolism (Goitre). **4.** · It helps to transport substances inside our body. · It helps our body to absorb nutrients from food. · It helps to regulate our body temperature. · It is needed for various chemical reactions that take place inside our body during digestion, excretion, etc. **5.** A child suffering from this marasmus disease is very thin and weak, stunted growth and body tissues slowly waste away. **Kwashiorkar:** A child suffering from this disease get swelling of stomach, dis colouration of hair, skin diseases, physical and mental growth get slowed down. 6. To test the presence of starch in potato slice: Take a potato slice on a plate. Now add few drops of iodine solution on potato slice. Observe what happens to the potato slice. If you will see a blue-black colour on the potato slice, it shows that the food item contains starch. 7. · Cellulose provides the bulk on which the muscles of the rectum can act. · It prevents constipation and ensures proper bowel

movement. **8.**

Minerals	Sources	Effects of deficiency	Disease due to its deficiency
Calcium	Milk, cereals, meat, fish	Brittle bones, Improper heartbeat, Muscle movement, Excessive bleeding	Rickets
Phosphorus	Milk, bajra, roti	Brittle bones, Improper heartbeat, Muscle movement, Excessive bleeding	Rickets
Iron	Green Vegetables, eggs	Fatigue, Pale look	Anaemia
Iodine	Fish, seafood, iodized salt	Abnormal growth of thyroid gland, abnormal metabolism	Goitre
Sodium, Potassium	Common salt, vegetables, milk	Dehydration, Extreme weakness	Electrolyte imbalance
Fluorine	Water	Defective teeth enamel and teeth decay	Tooth decay

HOTS : 1. Starch, 2. Anaemia, 3. She should include carbohydrates, proteins, vitamins, minerals and roughage rich food in her diet.

CHAPTER: 3 – SEPARATION OF SUBSTANCES

A. 1. b, 2. a, 3. c, 4. b, 5. c, 6. b, **B.** 1. threshing, 2. animals, 3. sieving, 4. filter, 5. evaporation, 6. distillation. **C.** 1. c, 2. e, 3. f, 4. d, 5. b, 6. a, **D.** 1. F, 2. T, 3. F, 4. T, 5. F, 6. T, **E.** 1. Mixture, 2. Handpicking, 3. Combine harvester, 4. Winnowing, 5. Filtration, 6. Evaporation, **F. 1.** A substance is said to be pure when each particle of the substance has the same type of unique property or contain same type of particle. **2.** A substance which is composed of two or more substances; in which each component retains its unique property; or has different types of particles is called mixture. **3.** The process that is used to separate grains from stalks is threshing. **4.** The

process of separation of lighter and heavier particles from the mixture by wind or blowing air is called winnowing. **5.** Filtration is a process by which insoluble solids can be removed from a liquid by using a filter paper. **6.** It is the process of separating small solid particles which remain suspended in the solution. Clay particles are separated from solution by using alum. **7.** The process of conversion of water into water vapour by heating it to its boiling point is called evaporation. **8.** The process of conversion of water vapour into its liquid form is called condensation. **G. 1.** We need to separate mixtures into different components to take out useful components or to remove harmful components. For example :

Separation process	Purpose for which we do the separation	What do we do with the separated components?
1. Separating stone from rice	To separate two different, but useful components	We throw away the stones.
2. Churning milk to obtain butter	To remove non-useful components.	We throw away the impurities.

2. Threshing is done to separate grains from stalks. This is done after harvesting of crops. Once wheat/paddy is harvested, the stalks are dried. Then, each grain of rice is separated from the stalks to which it is attached. It can be done by hand, by cattle, or by using machines. When the quantity is mall, threshing is done manually. For large quantities, threshing is done in done in the traditional way; by using animals. Nowadays, threshing machines are also used to separate large quantities of grain at a time. **3.** The process of separating insoluble substances which are heavier than liquid by allowing them to settle down is called **Sedimentation**. Decantation is used for separating a mixture of two liquids that do not mix with each other. For example, oil and water from their mixture can be separated by this process. **4.** The method of filtration is also used in the process of preparing cottage cheese (paneer) in our homes. You might have seen that for making paneer, a few drops of lemon juice are added to milk as it boils. This gives a mixture of particles of solid paneer and a liquid. The paneer is then separated by filtering the mixture through a fine cloth or a strainer. **5.** The salt can be easily obtained from the salty water by the process of evaporation. If we boil the water, the water evaporates completely, leaving behind only the salt. **6.**

Take a flask fitted with cork and a U-tube, Pour tap water in the flask till it half full. Take some cold water in the beaker, and place the test tube in it. Set up the apparatus in such as a way that the flask is kept on a stand and the free end of the U-tube is inside the test tube. Heat the flask using the Bunsen burner, till the water starts boiling. The steam formed passes through the U-tube into the test tube that is kept in cold water. Since the test tube is cold, the steam condenses to from water. The water formed in the test tube is distilled water. **HOTS**: 1. By sieving, 2. Because it does not have minerals important for our health. 3. Mud settles down at the bottom because it contains heavier particles like sand and soil.

CHAPTER: 4 – FIBRE TO FABRIC

A. 1. b, 2. a, 3. c, 4. a, 5. a, 6. b, 7. a, **B.** 1. Clothes, 2. Cotton, 3. Patsun, 4. Cotton, 5. Woollen, 6. Cotton, **C.** 1. T, 2. F, 3. T, 4. T, 5. T, 6. F, **D.** 1. d, 2. c, 3. b, 4. a, 5. f, 6. e, **E.** 1. Fibres, 2. Wool, 3. Black soil, 4. Spinning, 5. Shearing, 6. Cocoon, **F. 1. Fibres** are thin strands of thread, that are woven together to make fabric. **2.** Fibres which are obtained from plants or animals are called natural fibres. For example, cotton, jute etc. Fibres that are made by humans from chemical substances in industries are called **synthetic fibres**. For example, nylon, rayon etc. **3.** Knitting uses a single long yarn interwoven either by hand or machine. **4.** The process of growing silkworms on mulberry trees and obtain silk from them is called 'sericulture'. **5.** Removing the wool from sheep is called Shearing. **6.** The process of rotting the stems of the plant in water to remove the sticky substance and separate the fibres is called retting. **7.** Spinning is the process of transforming cotton fibre into thread. **G. 1.** About 30,000 years ago people covered their bodies with tree leaves and animal skins. Then they learnt the skill of weaving twigs and grass into mats baskets. Slowly they continued with their methods materials to cover their bodies as per their need and culture. With the invention of sewing needle they started wearing stitched clothes. It is believed that wool was used as early as 6000 years ago. Domestication of silkworms to produce silk occurred around 3000 BC in China. In India, cotton came into widespread use around 3000 BC. These fabrics were not stitched. They were just wrapped around the body. **2.** Fibres are classified into two groups: Natural fibres, and Synthetic fibres. **Natural fibres:** Fibres which are obtained from animal or plant are called natural fibres, for example: cotton, jute, wool etc. **Synthetic fibres:** Fibres that are made by human from chemical substances in industries are called synthetic fibres, for example: nylon, rayon, polyster, etc. **3.** When cotton bolls mature, they

burst open to reveal seeds surrounded by cotton fibres. These balls are picked either by hand or by machine. The raw fibre is removed from the seeds by **Combing**. The process is called **ginning of cotton**. Next, the fibre is cleaned to remove leaves and twigs. It is then spinned into yarn by a process called Spinning. Spinning draws out the short fibres from the mass of cotton and twists them together into a long thread. Spinning was earlier done by a simple hand spindle called Charkha. Nowadays, spinning on a large scale is done by machines. Spinning is the process of transforming cotton fibre into thread. The yarns are then used to make cotton cloth by weaving on looms. Weaving is a process of arranging two types of yarns together to make a fabric. Weaving is done on looms which are hand operated or power operated. The big reels of yarn called bobbins are used for weaving the cloth. In the looms, the yarn are placed lengthwise on the frame. These frames are called warp. Another yarn is attached to the shuttle of the machine. The shuttle carries the yarn back and forth across the yarn placed on the warp. The cloth is woven and bleached. It is dyed in different colours and given a finish. **4.** Jute is obtained from the jute plants called Patsun. It grows in low lying land with clayey soil which gets plenty of rainfall. The stem of a jute plant has thick bark that has fibres inside it. The plant is cut and immersed in water which rots the stems and separates the fibres. This process is called Retting. **5.** (a) Wool is the most common animal fibre obtained from hair of some animals like sheep, goat, yak, rabbit and camel. Today, India is among the top ten wool producers of the world. Removing the wool from sheep is called **Shearing**. After shearing, the wool is cleaned and spun into fibre. This fibre is then woven or knitted to make woollen clothes. Knitting uses a single long yarn interwoven either by hand or machine. (b) Silk or resham is a fibre used widely in India and other Asian Countries. Silk is a natural protein fibre obtained from protective covering called **cocoon** made by silkworm around itself. Silkworm larvae are fed on mulberry leaves. They grow into caterpillar that spins cocoon around it and changes into pupa. The cocoons are boiled in water and to loosen then, so that silk strand can be separated and spun into reel which further used to make silk cloth. The process of growing silkworms on mulberry trees and obtain silk from them is called 'sericulture.' China, Japan, Thailand are main producers of silk. **HOTS: 1.** Cotton is considered a more environment friendly fibre than silk because cotton doesn't cause any harm while silk is obtained by boiling cocoons of silk worm which kills the silk worm. **2.** a, **3.** Woollen clothes take longer to dry than clothes made from synthetic materials because woollen clothes hold water unlike the synthetic material.

CHAPTER: 5 – SORTING MATERIALS INTO GROUPS

A. 1. c, 2. b, 3. a, 4. a, 5. b, **B.** 1. smooth, 2. Lustre, 3. opaque, 4. Gas, 5. floatation, 6. soluble, **C.** 1. F, 2. T, 3. T, 4. F, 5. F, 6. T, **D.** 1. Classification, 2. Transparent, 3. Opaque, 4. Miscible, 5. Immiscible, 6. Conductor, 7. Insulators. **E. 1.** The three states of matter are solid, liquid and gas. **2.** Lustre is the special shine of some material. Gold and silver possess lustre. **3. Transparent objects:** They allow light to pass through them. e.g. glass, water. **Opaque objects :** They do not allow the light to pass through them. e.g. wood, metal. **4.** The property of a material to float on water is called Floatation. **5.** Rough materials have bumps or ridges on their surface, which can be felt by touching. The smooth materials lack these bumps. Rocks and sand paper, are examples of rough surfaces. A glass sheet and flower petals, are examples of smooth surfaces. 6. The property of substances to dissolve in water is called solubility. The substances that dissolve in water are called soluble substances and those that do not dissolve in water are called insoluble substances. **7.** The mixture containing the soluble substance and water is called a solution. **F. 1.**

S. No	Solid	Liquid	Gas
1.	Definite shape and volume.	Definite volume but no definite shape. They take the shape of the container they are poured into.	No definite shape and volume.
2.	Cannot be compressed.	Can be compressed slightly	Highly compressible.
3.	Particles are closely packed.	Particles are not as closely packed as in solid.	Particles are loosely packed.

2. The materials that are attracted by a magnet are called **magnetic materials**. The materials that are not attracted by a magnet are called **non-magnetic materials**. Objects made of iron are attracted to a magnet. In addition to iron, nickel and cobalt are also attracted to a magnet. **3.** Some

substances like most of the metals which allow electricity to pass through them are called conductors of electricity. Aluminium, copper and other metals are conductors. Other materials do not allow electricity to pass though them are called non-conductor of electricity or insulators. Paper, PVC, rubber, wool, etc. are insulators. **4.** Those materials that completely dissolve in water are called soluble and the things that do not dissolve in water are called insoluble. **5. Conduction of Electricity:** Some substances like most of the metals which allow electricity to pass through them are called conductors of electricity. Aluminium, copper and other metals are conductors. Other materials do not allow electricity to pass though them are called non-conductor of electricity or insulators. Paper, PVC, rubber, wool, etc. are insulators. **Conduction of Heat:** Some materials are good conductors of heat while others are bad. So we can group the materials into two classes on the basis of conduction of heat through them. **6. State:** All the substances are made up of matter. Matter exist in three states–Solid, Liquid and Gas.

Grouping based on the states of matter

S. No	Solid	Liquid	Gas
1.	Definite shape and volume.	Definite volume but no definite shape. They take the shape of the container they are poured into.	No definite shape and volume.
2.	Cannot be compressed.	Can be compress to small.	Highly compressible.
3.	Particles are closely packed.	Particles are not as closely packed as in solid.	Particles are loosely packed.

7. The substances which mix with water to form a solution are known as **miscible substances** and those which do not mix and form a separate layer are called **immiscible substances**. For example, Oil, Shampoo and Glycerine are immiscible in water. **HOTS: 1.** The process of grouping objects based on some known criteria is called Classification. Classification makes it easy for us to find things when we need them. It avoids chaos and makes our work systematic. **2.** Silver is considered the best conductor of electricity, though it is not used for making cables and wire because it is expensive. **3.** Objects can be grouped on the basis of shape, size, elasticity etc.

CHAPTER : 6 – CHANGES AROUND US

A. 1. a, 2. b, 3. c, 4. b, 5. a, 6. b, **B.** 1. slow, 2. natural, 3. reversible, 4. new, 5. desirable, 6. reversible, 7. man-made, **C.** 1. Physical change, 2. Chemical change, 3. Periodic change, 4. Desirable change, 5. Irreversible change, 6. Undesirable change, 7. Irreversible change, **D.** 1. Fast change, 2. Natural change, 3. Reversible change, 4. Non-periodic change, 5. Desirable change, 6. Chemical change, 7. Endothermic change. **E.** 1. Charles Darwin, the British naturalist, came up with the theory of evolution in 1859. **2.** Changes that take place over a long time are called **slow changes**. The growth of a plant from seed and changing milk into curd are examples of slow changes. **3.** The changes which are brought by nature or take place on their own are called natural changes. Change of seasons, rainfall and earthquake are natural changes. **4.** If a change can be easily reversed it is called a **reversible change**. In the change, the products can be converted back to their original form. For example, ice melts on heating and changed into ice again on cooling. If a change cannot be reversed it is called an **irreversible change**. Products cannot give the original substance back. For example, when a paper is burnt, it changes into ash and smoke is formed. **5.** Whenever any object or substance is heated, it gets affected in one or other way and brings change. For example, when water is heated, it changes into water vapour. Thus, state of a substance changes on heating. Molecules of water gain the heat energy supplied and spread all over, thus, water assumes the state of gas i.e., water vapour. **6.** Same as question-2, **7.** Desirable change is observed when raw mango is riped. **8.** Rose bud changing into rose flower is an example of change in shape. **F. 1.** Those changes which repeat themselves after regular interval of time are called **periodic changes**. Formations of day and night, motion of a swing, movement of a pendulum are all examples of periodic motion. Changes which do not repeat themselves regularly are called **non-periodic changes**. Natural disaster like floods and earthquake are non-periodic in nature. **2.** Change in which no new substances are formed are called physical changes while changes in which new substances with different properties are formed are called chemical changes. Tearing of paper is a physical change as no new substance is formed where as burning of paper is a chemical change as entirely new substances are formed. **3.** Changes which are for our benefit are called **desirable changes**. For example, ripening of fruits, cooking of food and changing of seasons. Those changes which are harmful for us are

known as **undesirable changes**. For example, floods, droughts, pollution and accidents. **4.** Changes in which no new substances are formed are called **physical changes**. For example, breaking of a glass, freezing of water, tearing of a paper, etc. Changes in which new substances with different properties are formed are called **chemical changes**. Cooking of food, burning of substances, etc, are chemical changes as entirely new substances are formed. **5.** There are some changes, during which energy in the form of heat is released. Such changes are called **exothermic changes**. For example, burning of fuel, lighting of match stick, etc. There are some changes during which heat is absorbed. Such changes are called **endothermic changes**. For example, decomposition of ammonium nitrate takes place only when heated. **6.** The changes which are brought by nature or take place on their own are called **natural changes**. Change of seasons, rainfall, turning of night into day, earthquake, etc. are all natural changes. These changes cannot be controlled by man. Changes which are brought by man are called **man-made changes**. Cooking of food, burning fuel, cutting paper, etc, are all changes carried out by human beings. These can be controlled by man. **7.** Whenever any object or substance is heated, it gets affected in one or other way and brings change. For example, when water is heated, it changes into water vapour. Thus, state of a substance changes on heating. Molecules of water gain the heat energy supplied and spread all over, thus, water assumes the state of gas i.e., water vapour. **8.** Same as Ans-E-4 , **HOTS : 1.** Iron gates are painted to prevent them from rusting as rusting is an undesirable and irreversible change. 2. Food is stored in the refrigerator to preserve from spoilage as low temperature slows the chemical change. **3.** High temperature will increase smog pollution. Smoke from wildfires causes air pollution which causes heart disease and being cancer. Desperation of animals and plants.

CHAPTER: 7 – GETTING TO KNOW PLANTS

A. 1. b, 2. b, 3. a, 4. c, 5. a, 6. a, 7. a, 8. a, **B.** 1. Roots, 2. venation, 3. pollination, 4. Plumule and burning of fossil fuels increases the lead of CO_2 leading air pollution. Noise pollution is a byproduct of urbanization, transport and industry. Eutrophication causes water pollution, 5. Ovary, 6. Neem, Jamun, 7. spines, 8. opposite, C. 1. F, 2. T, 3. T, 4. F, 5. T, 6. T, 7. F, 8. T, **D.** 1. e, 2. f, 3. g, 4. c, 5. h, 6. d, 7. a, 8. b, **E.** 1. Trees, 2. Roots, 3. After germination, 4. Stomata, 5. Carpel, 6. Pollination, 7. Fertilization, **F. 1.** Herbs are plants which have soft, green delicate stem. Their life cycle is for one or two seasons.

Some commons herbs are Mint, Rosemary, Coriander, etc. **2.** The main root comes out from the seed after germination. This is the primary root. Later, many small roots called lateral or secondary roots come out from the primary root. For example, Pea, Mango, Neem, Pine, Carrot, Radish and Beetroot have taproots. **3.** The points from where leaves grow on the stem are called **nodes** and the part between two nodes is the **internode**. **4.** There is no main root. A bunch of roots grow from the base of the stem and spread out into the soil. They have a bushy appearance. For example, Wheat, Maize, Onion, Sugarcane, Rice, etc, have fibrous roots. **5.** The leaves have tiny pores called **stomata**. These help in the exchange of gases during respiration.

6.

$$6CO_2 + 6H_2O \xrightarrow[\text{Chlorophyll}]{\text{Sunlight}} C_6H_{12}O_6 + 6O_2$$

Carbon dioxide — Water — Glucose — Oxygen

7. Fertilisation is the union of the male and the female reproductive cells. **8.** The transfer of pollen grains from an anther to a stigma is called Pollination. **G. 1. Annual plants :** The plants whose life cycle completes in one season are called annual plants. For example, Wheat, Mustard, Moong, Gram, etc. **Beinnial plants**: The plants whose life cycle complete in two seasons are called beinnial plants. For example, Carrot, Radish, Potato, etc. **Perennial plants:** The plants whose life cycle runs for more than two seasons are called perennial plants. For example, Neem tree, Jamun tree, Palms, etc. **2.** It bears leaves, flowers and fruits. It connects to all these parts with the roots. It can be hard and woody as in a tree or soft and green as in herbs. **Trunk** is the stem of a tree. It is covered with an outer covering called **bark**. The bark protects the inner part of the trunk. The points from where leaves grow on the stem are called **nodes** and the part between two nodes is the **internode**. Functions of the stem are as:

♦ The stem transfers water and minerals from the roots to the different parts of the plant. · It also transfers food made by the leaves to storage organs and to the growing parts of the plant. ♦ It bears the weight of the branches, leaves, flowers and fruits. ♦ It positions the leaves in such a way that they are exposed to maximum sunlight for performing photosynthesis. ♦ The stems of young plants are green and prepare food through photosynthesis. **3.** The arrangement of veins in the leaf blade is called **venation**. Leaf venation may be either reticulate or parallel. In reticulate venation, veins

are arranged in a net like pattern on both sides of the midrib. This is seen in leaves of plants like Pea, Petunia, Gram, Rose and Mango. In **parallel venation**, veins run parallel to one another. This is seen in leaves of plants like Grasses, Banana and Palms. **4.** A flower is made of four main parts. They are calyx, corolla, stamen and carpel. Calyx is the outeromost whorl of the flower made up of sepals. Corolla is made up of petals. Stamen is the male part while carpel is the female part of the flower. The flower is attached to the branch by the **stalk**. The stalk is also called the **pedicel**. The pedicel swells up as **thalamus**. A part from being attractive, the flower performs a number of functions which are: (a) They are used for medicinal purpose. (b) They are the reproductive organs of the plant. (c) They are used for decorative purposes. (d) They are used as spices also, e.g., clove. (e) Flowers are used for commercial purpose for the production of perfumes. **5.** The most important function of the seed is to give rise to a new plant. Apart from this, it has many other functions also. (a) It protects the embryo. (b) Seeds are often used as food. (c) It produces nourishment to the growing embryo. (d) Dispersed seeds give rise to plants at different places. **6.** A leaf consists of two main parts–the **petiole** and the **blade** or **lamina**. The flat, green portion of the leaf is called the **leaf blade** or **lamina**. It is attached to the steam by a narrow stalk like structure called the **petiole**. The petiole continues in the lamina as a thick vein in the **middle**. This vein is called the **midrib**. The midrib branches out to form a network of veins. These veins are called side veins. **HOTS: 1.** Yes, basil (Tulsi) is a herb., **2.** Food cannot be manufactured by brown stems as they do not contain the green pigment chlorophylle, required for photosynthesis which is present in green stems. **3.** Most flowers are brightly coloured with a sweet smell to attract birds and insects for pollination.

CHAPTER: 8 – MOVEMENT IN ANIMALS

A. 1. c, 2. a, 3. b, 4. a, 5. a, 6. a, **B.** 1. Snails, 2. Fish, 3. two, 4. pivot, 5. X-rays, 6. Joint. **C.** 1. d, 2. c, 3. b, 4. e, 5. a, **D.** 1. Vertebrates, 2. Invertebrates, 3. Setae, 4. Foot, 5. Ligaments **E. 1.** Animals that have a backbone are called **vertebrates**. For example, Fish, Frog, Lizard, Horse, Bird, etc. **2.** The muscular organ of snails called foot produces slimy substances called mucus. Snails actually crawl on the layer of mucus. **3.** Muscles are attached to bones by tough-tissues called **tendons**. **4.** The region where two bones meet is called a **joint**. **5.** Earthworm has stiff hair-like projections called **setae** to grip the ground so that the body can move forward by regular

contractions and expansions of the muscles. **6.** X-rays were discovered by German physicist Wilhelm Conrad Roentgen in 1895. **7.** Backbone is the set of 33 small bones that protects the spinal cord. It runs down from the neck to below the hip. **F. 1.** The earthworm does not have a skeleton. Instead, it has liquid trapped in spaces inside the body. The muscles squeeze against the liquid and keep the body firm. The earthworm has a segmented body. It moves its body using sets of muscles which contract and expand the body. It also has stiff hair-like projections called **setae** to grip the ground so that the body can move forward by regular contractions and expansions of the muscles. While moving, the earthworm extends the front part of the body keeping the rear end fixed. Then it fixes the front end and releases the rear end. **2.** Fish have streamlined body which offers least resistance to the flow of water and makes it easier for them to swim. Fish has various types of fins and tail that help it to swim. While swimming, forward movement take place as follows:

• Muscles make the front part curve to one side and the tail part to the other side. • After that, the front body part and the tail part quickly curve to the other side. These movements produce a jerk and push the body forward. A series of these jerks help the fish to swim forward. **3.** Skeletal system performs the following functions: • It helps in the movement of various body parts. • It provides shape and support to the body. • It protects the soft internal organs. • Bones are filled with a substance called Marrow, which produces the blood cells. **4.** The main joints present in the body are given below:

• **Hinge Joint:** This kind of joint provides back and forth movement similar to the hinges of a door. For example, joints at the knee and the elbow. • **Ball and Socket Joint** The ball and socket joint is present in the hip and the shoulder joints. The end of one of the bones is round like a ball and fits into a hollow part (socket) in the other bone. This joint allows movement in all directions. • **Pivot Joint:** The joint of the skull to the first two vertebrae of the backbone is a pivot joint. It allows the head to turn to the left and right, and also move up and down. • **Gliding Joint:** This kind of joint allows bones to glide over each other providing little movement in all directions. For example, joints at the ankle and the wrist. **5.** Bone is a hard connective tissue that forms the skeletal system of the body. However, cartilage is comparatively a less rigid and smooth tissue present mainly in the areas of the body including nose, ear, joints etc., and primarily acts as a shock absorber in the ends of the joints for protecting the bones from rubbing

against each other. **HOTS: 1.** Fins provide stability and direction while swimming and prevent the body from rolling. Thus, the under water drivers wear fin-hypline flippers on their feet that they can swim easily in water. **2.** Our legs at the knee or our hand at the elbow has hinge joint which provides only back and forth movement like the hinges of the door and do not allow movement in all directions. Hence, we are not able to rotate our legs or our hand at the elbow.

CHAPTER: 9 – HABITAT OF ORGANISMS

A. 1. a. 2. d, 3. b, 4. d, 5. a, 6. b, 7. b, **B.** 1. Terrestrial, 2. abiotic, 3. Xerophytes, 4. Deer, 5. aerial, 6. plants, animals, microorganisms, 7. Camel, 8. Gills, **C.** 1. T, 2. T, 3. F, 4. T, 5. F, 6. T, 7. T, 8. F, **D.** 1. Aquatic, 2. Desert, 3. Mountain, 4. Aquatic, 5. Grassland, 6. Aerial, 7. Mountain, 8. Aerial, **E. 1.** The place where each organism lives naturally is called its **habitat** or **dwelling place**. **2.** To live in a particular kind of surrounding, organisms develop special structures or do functional adjustments that help them to survive in their habitat. This is known as **Adaptation**. **3.** All living things including plants, animals and microorganisms constitute the biotic or biological components. They make up the **biotic** (or **biological**) **environment**. Soil, water and air, as well as climatic factors such as temperature, rainfall, humidity and wind speed make up the **non-living** or **physical components**. These make up the **physical** or the **abiotic environment**. **4.** Animals which are adapted for the aerial mode of life are known as **aerial animals**. Common animals are bat and birds. **5.** The different types of habitat are : i. Terrestrial habitat; This includes forests, grasslands, mountains and deserts, ii. Aquatic habitat: This include marine habitats like ocean and fresh water habitats such as river and ponds. iii. Aerial habitat : This includes aerial animals. **6.** i. **Floating plants** have long, slender, spongy and flexible stems with air cavities. Less weight helps these plants to remain floating. ii. Leaves have waxy coating to prevent decay. **7.** Aquatic animals have boat-shaped body, i.e. narrow at the ends and wider in the centre. Such shape is called streamlined shape. **8.** Plants and animals that live on land are said to live in terrestrial habitats. Some examples are forests, grasslands, deserts and mountain regions. **F. 1.** Both prey (animal to eat) and the predator (animal that eats) are adapted to survive. • The deer has long ears to hear movements. To see in all directions it has eyes, on the sides of its face. It can run fast to escape from predator such as lions. • The giraffe on the other hand has a long neck to reach the topmost of tress, where other

herbivores cannot reach. • In case of a lion, its light brown colour helps it to hide in grass so that the prey cannot see it. This is known as **camouflaging** or **blending** with the surrounding. **2. Adaptations in mountain plants:** Coniferous trees are found in mountains. These have dropping branches to shed excess rainwater and snow. Needle-like leaves and waxy coating on them prevent water loss in freezing weather. **Adaptations in mountains animals:** Animals living here have thick skin or fur to protect them from cold. They have thick and strong limbs with strong hooves to run and climb on the Rocky Mountains. As we go higher and higher in the mountains, the type of plants and animals change. **3. Adaptations in aquatic animals:** • They have boat-shaped body, i.e., narrow at the ends and wider in the centre. Such shape is called streamlined shape. It reduces resistance to water while swimming. •They have gills that help them to absorb the dissolved oxygen in water. • They have scales on their body surface to prevent their body from decay. • Presence of fins and tails helps them to move forward and change directions while swimming. **4. Aerial animals have following adaptations:** • They have streamlined body which is covered with feathers. • Their forelimbs are modified into wings. • The nervous system and sense organs are well developed. **5. Adaptations in desert animals:** Many desert animals and insects survive the heat of the day by staying in burrows deep inside the sand during the day. A camel has several adaptation to help it survive in a desert. • It has a hump where fat is stored. This provides food in times of shortage. • It can drink a very large quantity of water and then stay without water for long time. • It creates very little water in the form of urine. Its dung is dry and it does not sweat. **6. A fish has the following adaptations:** • Streamlined, body shape, which helps movement in water. • Scales, which protect the internal organs of fish. • Flat fins and tails, which help the fish to change direction while swimming. • Gills, which helps the fish to use oxygen dissolved in water to breathe. **7. Living Things Need Food :** All organisms need food. Plants make their own food through photosynthesis. Animals are dependent on plants or other animals for their food to get energy and to grow. **Living Things Grow :** All living things grow up to a certain size. On the other hand, non-living things remain the same in size. They do not show any growth. **Living Things Respire:** All living things breathe air. The oxygen taken in from air helps the body to break down the food to release energy. This process is called respiration. **Living**

Things Show Response to Stimuli: All living organisms show movements. Most of their movements are on their own but some movements are due to some changes take place in their surroundings. **Living Things Reproduce:** All organisms reproduce their own kind so that the continuity of one kind of plant or animal is maintained. Some animals lay eggs, such as fish, birds, snakes, etc. Some give birth to their young ones such as human beings, cat, cow, etc. Plants reproduce by different methods. • **Living Things Move:** All living organisms show movement. These movement may be from one place to another or movement of a part of the body. • **Living Things Die:** All living things die after completing their life cycle. **8.** Adaptations refer to changes in an organism over a long period of time. There are certain changes that can occur in an organism over a short period of time, which help the organisms adjust to the changes in its surroundings. This is called **acclimatization**. For example, sheep grow very thick wool in cold climates. **HOTS : 1.** Terrestrial, **2.** People wear cotton clothes to help them live in a desert. Cotton clothes let the air in when the sweat evaporates, it makes the body cool. Cotton clothes are therefore comfortable to wear in the hot climate of desert.

CHAPTER: 10 – MEASUREMENTS AND MOTION

A. 1. b, 2. c, 3. c, 4. b, 5. d, 6. a, 7. a, **B.** 1. Footstep, 2. estimation, 3. uniform, 4. oscillatory, 5. length, 6. Arm length, 7. periodic, **C.** 1. T, 2. T, 3. T, 4. F, 5. F, 6. F, 7. F, **D.** 1. Cubit, 2. SI, 3. Metre, 4. 100 centimetre, 5. Rest, 6. Curvilinear, 7. Vibrations, 8. Random motion, **E.** 1. Measurement means giving a number to something that is measurable, like length, mass, volume, etc. **2.** If an object changes its position continuously with respect to the stationary objects around it, it is said to be in motion. **3.** The rough idea of 'how much' is called 'estimation'. **4.** Cubit is the length between the tip of the middle finger and the elbow. **5.** When an object moves along a straight line, it is said to be in linear motion or rectilinear. For example, a car moving in a straight line. **6.** Measuring tapes, metre rods. **7.** When an object undergoes both translatory as well as rotatory, it is said to be in rolling motion. For example, motion of a bicycle wheel. **8.** Handspan, cubit, arm length and footstep differ from person to person. This is because the hand, arm and foot length of all humans is not same. Hence, these ancient methods of measuring length lack precision. **F. 1.** In ancient times, people used handspan, cubit, arm length, and footstep as different units of measurement of length and distance. **Handspan:** It is the length between the tip of the thumb and the little finger, when stretched. **Cubit :** It is the

length between the tip of the middle finger and the elbow. **Arm length :** It is the length between the shoulder and the middle finger. **Footstep :** It is the length between toe and the heel of the foot. **2.** When an object changes its entire position, it is said to be translatory motion. For example, movement of a car. Translatory motion is of three types : a. Linear (or Rectilinear motion) b. Curvilinear (or Circular motion) c. Random motion **Linear motion :** When an object moves along a straight line, it is said to be in linear motion. For example, a car moving in a straight line. **Curvilinear motion:** When an object moves along a curved path, it is called curvilinear motion. For example, motion of a car along a curved road. When an object moves along a circular path, it is called circular motion. For example, whirling of a stone tied to a string. **Random motion:** Random motion is irregular motion in all the possible directions. For example, the motion of a dolphin in water, motion of an ant, etc. **3.** • **Uniform motion :** Motion is said to be **uniform**, when it covers equal distances in equal interval of time. • **Non-uniform motion :** Motion is said to be **non-uniform**, when it covers unequal distances in equal interval of time. **4.** The length of a curved object or line can be measured with the help of a string. **To measure the length of a curved wire.** Take a long string. Knot one end of the string and touch it to one end of the wire. Now, little by little stretch the string along the wire with the help of the thumb and index finger of both your hands. When you reach the end, hold the string at that point and mark it with a pen. Now, straighten the string and measure it along a ruler to get the length of the wire. **5.** A standard unit is a standard measure that has some definite and convenient quantity in it, so that it remains the same, whenever, by whoever and wherever it is used. With the help of a standard unit you can: • reproduce a certain quantity accurately, e.g., 8 metre cloth, 5 kilogram rice or a 20 minute school period. • understand the meaning of a measured quantity, e.g., a 3 metre high wall, a concrete block of mass 200 kg, a sprinter finishing a race in 8.9 sec. etc. **6.** In ancient times, people had to walk, use boats or animals like horse to travel from one place to another. They used simple boats and rafts made of tree trunks to travel across rivers. Later, invention of the wheel led to the development of several other modes of transport like cart, ship, train, car and aeroplane. **7.** In oscillatory motion, object moves to and fro from its original position. For example, the movement of a pendulum. In this type of motion, the motion is repeated after a fixed interval of time. Small and

rapid oscillations are called **vibrations**. Small and rapid to and fro movement of a body or a part of it from its original position is called **vibratory motion**. **HOTS : 1.** Yes, 2000 m = 2km, which is within 5 km. Arjun's school admits children who live within 5 km from the school. Hence his cousin, Ajay will get admission in the school.

2. 1 km = 1000m
1000 m = 1 km
20, 00, 000 m = 2000 km.

3. 1 cm = 10 mm
So, Maths text book = 10mm thick
and Physics text book = 11 mm thick
Hence, Physics text book is thicker

CHAPTER : 11 - MAGNETS

A. 1. b, 2. b, 3. c, 4. a, 5. a, 6. c, 7. b, 8. a, **B.** 1. iron oxide (Fe_2O_3), 2. magnetic compass, 3. Like, 4. permanent, 5. iron, 6. North, South, 7. magnetic keepers, 8. Electromagnets, **C.** 1. c, 2. e, 3. d, 4. a, 5. b, 6. g, 7. f, **D.** 1. Magnetic materials, 2. Non-magnetic materials, 3. Magnetic force, 4. Magnetic compass, 5. Temporary magnets, 6. Permanent magnets, **E.** 1. About 3000 years ago, a shepherd boy named Magnes who lived in a town Magnesia in Greece discovered magnet. **2.** The regions of a magnet where the magnetic force is strongest are called the **poles of the magnet**. **3.** The substances that are easily attracted by a magnet are called magnetic substances. e.g., Iron, cobalt. **4.** Iron, cobalt and nickel can be used to make a permanent magnet. **5.** The substances that are not attracted by a magnet are called non-magnetic substances. e.g., stainless steel, wood. **6.** Iron Oxide (Fe_2O_3), **7.** Magnets that retain their magnetic properties only for a short period of time are called **temporary magnets**. 8. Maglev (derived from magnetic levitation) is a transport method that uses magnetic levitation to move vehicles without touching the ground. **F.** 1. About 3000 years ago, a shepherd boy named Magnes lived in a town Magnesia in Greece. One day, while he was pasturing his cattle flocks he sat down on a blackish rock to take little rest. While getting up, he found that the nails of his shoes and the iron hook of his stick were strongly attracted to the rock. This rock was the first magnet discovered by a man. **2.** Magnets have several uses: • Magnets are used in making magnetic stickers. • They are used by doctors to pull out small iron particles from the wounds of the victims of accidents. • Electromagnets are used to lift heavy loads in warehouses.

• Electromagnets are used in the door bells, electric motors, generators, television sets, computers, telephones, etc. • Electromagnets are used for separating iron from scrap in junk yards. • Magnets are used in special trains called Maglev. • Magnet is used in speakers, microphones, computer monitors and picture tubes of television. • Magnet is used in cassettes, ATM cards, credit cards and debit cards to store information. **3.** The magnetic poles always exist in pairs. If a bar magnet is broken into two equal parts it is found that each part has a North Pole and a South Pole and is a magnet by itself. If each part is broken into smaller pieces, each piece has two poles. One pole cannot be separated and isolated from the other. **4.** While handling magnets, we should be careful about a few things. They are : • We should never throw them. • We should not hammer them. • Heating of the magnets should be avoided. • Magnets should be stored with magnetic keepers. • Magnets should be kept away from cassettes, mobiles, television, music system, computer and CDs. **5.** Any piece of iron or steel can be magnetised if you are stroking it with a strong magnet. Mark one end of a piece of steel and place it on a wooden table. •Place one pole (say N-pole) of a strong bar magnet at the marked end of the steel (or iron) piece. • Rub (or stroke) the bar magnet over the steel piece along its length and lift it up from the other end. Bring the same pole of the magnet to the same end of the steels piece and repeat the process 30 to 40 times. • Now bring the magnetised piece of steel near iron filings. • Iron filings stick to the piece of steel. This shows that the steel piece has become a magnet. • Test the two poles of the magnetised piece of steel with the help of a compass. The end at which the bar magnet is lifted has become the south pole (S-pole). The other end is the N-pole. **6.** If a magnet is allowed to move freely, it comes to rest in a direction very close to the earth's North-South direction. This property of magnet is used to find directions on the surface of the earth by travellers. An instrument with a magnet that is used to find directions is called **magnetic compass**. It has a small magnetic needle at its centre. This needle can rotate freely and always points in the earth's North-South direction. Different directions (north, south, east and west) are marked on the compass. **7.** The materials that are easily attracted by a magnet are known as **magnetic materials**. And the materials that are not attracted by a magnet are known as **non-magnetic materials**. Not only iron, but cobalt and nickel also show magnetic

properties. Steel, an alloy of carbon and iron, also shows magnetic properties. But stainless steel, made from steel, nickel and chromium does not show magnetic properties. **8.** After learning how to magnetise any iron object, you can also make your own magnetic compass. You first need to magnetise an iron needle using a bar magnet as described above. Take a small piece of wooden cork or foam and insert the magnetised iron needle through it (in its upper part). Take a cup or a bowl full of water and place the cork into it. The cork will float in water. Ensure that the needle does not touch the water. Your magnetic compass is now ready to work. **HOTS : 1.** We should not put a magnet near a TV or a computer as it can decrease the magnetic properties of the magnet and also damage the T.V. or computer. **2.** If it repels any side of the piece of iron, the piece of iron would be a magnet. Repulsion is the sure test of magnet.

CHAPTER : 12 - LIGHT

A. 1. b, 2. a, 3. c, 4. b, 5. b, 6. a, 7. b, 8. d, **B.** 1. e, 2. a, 3. b, 4. c, 5. d, 6. g, 7. f, **C.** 1. Luminous, 2. Opaque, 3. Beem, 4. incident, 5. sun, tubelight, 6. Propagation, 7. reflected ray, **D.** 1. Bulb, 2. Tree, 3. Sun, 4. Tube light, 5. Glass, 6. Frosted glass, 7. Door, 8. Propagation, **E.** 1. "Light is a form of invisible energy which gives us the sensation of sight." 2. The objects which emit light are called luminous objects. The various luminous objects are the sun, electric bulb, tube light, burning candle, lamp, etc. 3. When light falls on an opaque object, it does not allow the light to pass through. This creates a dark area behind the object. This area is called the shadow of the object. 4. Propagation is a process by which a sound or light rays travels. usually light travels in a straight line. Ray is a line with an arrow that shows the direction of propagation of light. **5.** The following three things are required for a shadow to form: • A source of light • An opaque object • A screen or surface behind the object. A shadow will not form if any of these is absent. It is only when light rays are obstructed by an opaque object that we get a shadow of an object. **6.** An object that gives out light is called a source of light. Luminous objects are also called sources of light. Sources of light can be natural or man-made (artificial). Natural sources of light are sun, moon, stars etc. and also some insects like firefly. Man-made sources of light are candle, electric bulb, and laser, etc. **7.** Three things required to form a shadow: • A source of light, • An opaque object, • A screen or surface behind the object. **8.** A ray of light travelling from an object towards the mirror is called an incident ray. **9.** The ray coming out from the mirror is called the

reflected ray. **F. 1. Transparent substances:** A substance which allows light to pass through it is called transparent substance. Glass, water, acrylic sheets, cellophane paper and air are examples of transparent substances. **Opaque substances :** A substance which does not allow light to pass through it is called an opaque substance. Wood, cardboard, metals, most rocks and stones are the examples of opaque substances. **Translucent substances:** A substance which allows only a part of light to pass through it is called a translucent substance. Frosted glass, ground glass, wax-paper, our blood and skin are the examples of translucent substances. Any object seen through a translucent substance looks hazy. **2.** A shadow has following three characteristics: • It is always black, regardless of the colour of the object. • It only shows the shape or outline of the object and not the details. • The size of a shadow varies depending on the distance between the objects and the source of light, and the distance between the object and the screen. **3.** Ray is a line with an arrow that shows the direction of propagation of light whereas beam is a group of light rays moving in an organized manner. **4.** The pinhole camera is an optical instrument that forms an image of an object on the screen. It works on the rectilinear propagation of light. It was used in ancient times to view eclipses without causing any damage to the eye. **5.** Different between the Image and Shadow of an object:

Image	Shadow
1. Has the colour of the object.	1. Is always black, regardless of the colour of the object.
2. Gives the details as well as the outline of the object.	2. Gives only the outline of the object.
3. Undergoes lateral inversion.	3. Does not undergo lateral inversion.

6. A solar eclipse occurs when the moon comes in between the sun and the earth. The moon blocks the sun's light. The shadow of the moon falls on the earth. A total solar eclipse can be seen in the part of the earth where the light from the sun is completely covered by the moon. **7.** As the moon moves around the earth, it sometimes comes in a straight line with the sun and the earth. When the earth, the moon and the sun are in a straight line and the earth is in between the sun and the moon, the shadow of the earth falls on the moon and this is known as a **lunar eclipse**. **HOTS : 1.** We do not see our

image, if we are standing in front of a clear glass window pane because the light rays pass through the transparent glass window and no rays are reflected back. **2.** Yes, when two or more mirror are placed at different angles we get multiple shadow.

CHAPTER: 13 – ELECTRICITY AND CIRCUITS

A. 1. b, 2. b, 3. a, 4. d, 5. b, 6. d, 7. d, **B.** 1. Power station, 2. insulator, 3. conductors, 4. Switch, 5. positive terminal, negative terminal, 6. Electricity, 7. Agron, Neon, Nitrogen, 8. Key, 9. conductors of electricity. **C.** 1. e, 2. d, 3. a, 4. c, 5. b, 6. g, 7. f, **D. 1.** Electricity, **2.** Button cells, **3.** Tungsten, **4.** Electric circuit, **5.** Switch, **6.** Power station, **7.** Circuit diagram, **E.** 1. Electricity is the flow of electric charge. **2.** The electricity to the bulb in a torch is provided by the cylindrical objects present in it called **electric cells**. **3.** An electric circuit is the complete passage of electricity from one end to another end of an electric cell, through a bulb. **4.** We use electric switches to put on or off the electrical devices and machines. **5.** The materials which allow electricity to pass through them. are called **conductors**. All metals are conductors of electricity. **6.** A fuse is an electrical safety device that can stop current from flowing, if it becomes overloaded, or a device that is used to ignite an explosive device. **7.** An **electric switch** is a device that is used to open or close an electric device. In an electric circuit, a switch is sometimes referred to as a 'Key'. **8.** Materials such as plastic, glass, wood and rubber do not allow electricity to pass through them. These are called bad conductors or insulators. **F. 1.** Electricity is very important and widely used form of energy. It is an integral part of our day-to-day life. Electricity is the flow of electric charge. Electricity is a form of energy which is converted from other sources of energy like coal, natural gas, nuclear power and the like. These sources of energy are said to be the primary sources of energy. Some common electricity producing devices are cell, battery, generators, etc. The sources required to make electricity may be renewable or non-renewable but electricity is non-renewable. Electricity can be transformed into other types of energy as and when required. Electricity is supplied from power stations to different areas. **2.** A dry cell is used to produce electric current. A dry cell has two ends or terminals. • One of the ends has a small circular metal cap. This is the **positive terminal**. It is marked with a plus sign (+). • The other end has a flat metal plate. This is the **negative terminal**. It is marked with a minus sign (–). The dry cell has chemicals stored in it. The chemical energy stored in them is converted into electrical energy. The dry

cell can generate electricity until the chemicals are used up. After that, it has to be replaced with a new cell. These kinds of cells are called **primary cells** or **disposable cells**. **3.** An electric bulb has an outer case made up of glass. The outer case is fixed on a metallic base. The wire inside the glass case is made of **tungsten**. It is either coiled or straight. It serves as a **filament** to the bulb. The electricity passes through the filament. It gets heated up and gives out light. The inside of the electric bulb is first evacuated and then filled with a mixture of **inert gases** like argon, neon and nitrogen. If this is not done, the filament on heating up would react with the oxygen in air and burn itself. The filament is fixed to two thick wires. One wire touches the bottom of the bulb and the other wire touches the metal casing. These wires also provide support to the filament. The bottom of the bulb and the metal casing act as two terminals of the bulb, i.e., positive and negative terminals. These two terminals are fixed in such a manner that they do not touch each other. The lower end of the metal casing is filled with an insulator. When the two terminals are joined to an electric cell, the electric current flows through the filament which gets heated up and starts glowing. **4.** A power station is the main source of electricity. These power stations are mostly situated away from the city. Electricity generated in these power stations is brought to our houses through thick wires. There are a variety of ways in which electricity is produced in these power stations. Following are five ways by which electricity is generated in various power stations— a. by burning coal, b. from natural gas, c. from water by building dams in rivers, d. from wind power, f. from solar energy. **5.** Do yourself, **6. Uses of Insulators and Conductors (a)** Insulators are safety devices, as they prevent us from shock and electric fire.(b)Conductors allow electricity to flow through them, thus they provide a passage to electricity. (c) Switches, electric plugs and sockets are made of conductors. **7. To find whether a given substance is a conductor or insulator.** Connect two wires to the two terminals of a dry cell. Connect one of these wires to one terminal of a bulb. Now the circuit has two ends, one end connected to the dry cell and the other end connected to the bulb. Now take a pencil sharpened at both ends and touch its ends to both the ends of the circuit. You will see that the bulb glows. The pencil is a conductor, hence the bulb glows. Now, replace the pencil with other things such as an iron nail, glass rod, plastic scale, eraser and cotton. Note whether the bulb glow or not in each case. Record your observation. The things that allow the bulb to glow are conductors. The gases that do not allow the bulb to glow are insulators. **HOTS: 1.** An electric switch is used to open or close

the circuit. If we did not have an electric switch in a circuit, the circuit can not be opened or closed, when required. **2.** Chemicals are stored inside the cell. The chemical energy stored in them is converted into electrical energy.

CHAPTER: 14 – WATER

A. 1. c, 2. c, 3. b, 4. a, 5. b, 6. a, 7. d, **B.** 1. 97, 2. potable, 3.condensation, 4. water cycle, 5. tidal waves, 6. 60, 7. 0°C, 100°C. **C.** 1. T, 2. F, 3. T, 4. F, 5. T, 6. F, 7. T, **D.** 1. 6.8 to 7, 2. 3% of total water on earth, 3. Agriculture, 4. Water turbines, 5. Epidemic **E. 1.** The different sources of water are ocean, seas, rain, snow, river, lakes, ponds, wells and springs. **2.** The water changes from liquid to vapour state below the boiling point. This is known as evaporation. **3.** A change in state from gaseous to liquid is called condensation. **4.** The different uses of water are agricultural needs, industrial needs and personal or domestic needs. **5.** Rain water harvesting is done by following methods : • Water is collected from the clean roofs of the buildings through pipes and then stored in rainwater tanks. This water will be filtered for future use. • Rainwater can also enter groundwater reserves directly from the roadsides. Water seeps directly into the soil from roof tops through pipes entering into pits in the ground. This helps to recharge or refill the groundwater. **6.** Epidemic is a disease affecting thousands of people at the same time. When there is no rainfall for several years, there is severe shortage of water and lakes and ponds dry up. Plants also die and this condition is known as drought, people and live stock die due to shortage of food and water and such a condition is known as famine **F. 1.** Our country depends a lot on agricultural. Farmers rely on water to sustain their agricultural crops, e.g., wheat paddy, etc. Many a times, rainfall is not sufficient to water these crops, and farmers have to use artificial watering systems, referred to as irrigation. **2.** When the temperature of air increases, it expands, i.e., its particles move away from one another). This makes the air lighter and it rises in the atmosphere, taking water vapour with it. As the air rises, it begins to cool. The water vapour condenses on dust particles present in the atmosphere to form millions of tiny droplets. Tiny ice crystals will be formed instead if it is very cold. This cluster of tiny water droplets floating in air is what we call a cloud. **3.** Water continuously moves from the earth to the atmosphere and from the atmosphere back to the earth again. This circulation of water in nature is called water cycle. Water cycle takes place in three steps: • Water is converted into water vapours by many processes like evaporation, transpiration, etc. • The water vapour rises up, becomes cooler

and condenses to form tiny droplets which float in air as clouds. • Many droplets come together to form large drops which fall down as rain. **4.** Some places have heavy rainfall during the monsoon seasons. Sometimes, the rains are so heavy that the rivers start overflowing their banks resulting in **floods**. The water also floods agricultural and residential land causing immense damage to crops, livestock, houses and roads. Electric lines, water supply and the communication networks also get affected. At the same time, there are places where there may be no rainfall for several years. This results in a severe shortage of water, as lakes and ponds dry up and plants die. Such a condition is known as **drought**. **5.** Some ways by which we can conserve water are as follows: • Avoiding wastage of water and recycling water in places like factories and even homes. • Planting trees and other vegetation as they help in absorption of water by the soil. • Reducing water pollution by treating sewage and industrial wastes before disposing them. • Rainwater harvesting is an important method to conserve water by collecting rainwater. It involves collection of water from surfaces on which rain falls and subsequently storing it for future use. **HOTS: 2.** We find droplets on the underside of a plate that is put on a hot bowl of soup as some water from the hot soup evaporated and then condensed as droplets on the underside of the plate as the plate was relatively colder. **3.** An alternate way to dispose off waste is to classify into biodegradable and non-biodegradable. Recycle the non-biodegradeble waste and compost the biodegradable waste which could be used as a manure later.

CHAPTER: 15 – AIR

A. 1. b, 2. c, 3. b, 4. a, 5. a, 6. b, 7. a, **B.** 1. atmosphere, **2.** photosyn thesis, 3 . hydrilla, 4. 78%, 5. 0.03, 6. lungs, 7. respiration, **C.** 1. c, 2. d, 3. e, 4. b, 5. a, **D.** 1. Air, 2. Atmosphere, 3. Fuels, 4. Dust, 5. Nostrils, 6. Lungs, 7. Wind mills, **E. 1.** A thick blanket of air, called the atmosphere, surrounds our earth. **2.** The main constituents of air are nitrogen, oxygen, carbon dioxide, inert gases (mainly argon) and water vapour. **3.** Most aquatic animals like Fish, have special organs for respiration called gills. Gills help to take in oxygen and give out carbon dioxide. **4.** Air pollution is the contamination of air by undesirable substances known as pollutants. **5.** All living things need oxygen for respiration. Plants take in oxygen through stomata present on the underside of their leaves and tender parts of their stems. Oxygen is also needed for combustion or burning. Combustion is required to produce heat

for cooking and other purposes. **6.** Amphibians like Frog, Newt, and Salamander need breathing systems for both air and water. Crocodile and Alligator swim through water with part of their snout above the water surface to breathe easily through nostrils. **7.** Aquatic plants like Hydrilla also breathe in oxygen dissolved in water through their stomata. **8.** Birds have an efficient respiratory system as they need high level of oxygen during flight. Birds have a pair of lungs with air sacs that remain open all the time, so that air can easily pass through them. **F. 1. To show that air contains carbon dioxide gas.** Take a small sample of limewater in a test tube. With the help of air pump, bubble air through it for sometime. Limewater turns milky. **2. To show that air contains water vapour.** Place ice-cold water and a few ice-cubes in a beaker and place it on a table. After sometime you will find water droplets on the outer surface of the beaker. This is due to the condensation of water vapour present in the air. **2.** We all need air to survive. Air contains oxygen and carbon dioxide useful to plants and animals. Plants use carbon dioxide of the air to make their food by a process called photosynthesis. Oxygen is used by both plants and animals for respiration (photosynthesis and respiration are vital processes that supports life). **3.** • Air Supports life. • Air supports combustion. • Air helps birds to fly. • Aquatic plants and animals take in dissolved air. • Oxygen is used in oxygen cylinders for medical purposes. • Moving air is called wind. Wind helps in sailing parachutes, yacht, gliders, etc. Wind mills generate electricity. **4. To show the presence of air in soil.** Take a jar, some soil, and a jug of water. Take some soil in a jar and pour water into it. Can you see bubbles coming out? What does it suggest? You will observe the bubbles show the presence of air in the soil. Now you can conclude that the animals living inside the soil take in air present in soil. **5.** Air is all around us. We cannot see the air but feel its presence. When we switch on the fan, the air present in the room starts moving and you can feel it. Many processes such as storm, flying kite, swaying of trees, winnowing, etc., show the presence of air or wind around us. **6.** Plants have tiny pores called stomata, found on the underside of a leaf. Air containing carbon dioxide and oxygen enters the plant through these openings where it gets used in photosynthesis and respiration. **7.** Land animals and plants breathe air (oxygen). Green plants take in air (carbon dioxide) which is formed as a result of respiration to prepare their food by the process of photosynthesis. Oxygen evolved during photosynthesis is used by living beings in respiration. Thus, plants help in

maintaining the balance of carbon dioxide and oxygen in nature. **HOTS : 1.** It is good to sleep under a tree during the day as photosynthesis occurs during the day and releases oxygen from the tree while during night only CO_2 is released as only respiration occurs. **2.** Although carbon dioxide leads to global warming, it is still considered very important for owr survival because plants need CO_2 for the process of photosynthesis by which plants make food that is used by both plants and animals for survival. **3.** He keeps the mask to prevent himself from air pollution.

CHAPTER : 16 – MANAGING WASTES

A. 1. a, 2. c, 3. c, 4. d, 5. b, 6. a, 7. a, 8. c, **B.** 1. d, 2. c, 3. e, 4. b, 5. a, **C.** 1. Waste, 2. Solid, 3. biodegradable, non-biodegradable, 4. non-biodegradable, 5. recycling, 6. raw materials, 7. non-biodegradable, 8. Recycling, **D.** 1. Waste, 2. Liquid waste, 3. Garbage, 4. Degradation, 5. Reuse, **E. 1.** Anything that is of no use to us, forms waste (garbage). **2.** Composting is clean, cheap and safe. It considerably reduces the amount of garbage to be disposed. The manure thus obtained is also rich in nutrients. **3.** Careless disposal of plastics bags chokes drains, hinders the absorption of water by soil, and can even kill animals such as cows, if they eat them by mistake. Today, the non-biodegradable nature of plastics and the widespread use and careless disposal of plastic products have made them a threat to the environment and public health. **4.** Biodegradable wastes are the wastes that rot by the action of decomposers. Non-biodegradable wastes are the wastes that do not rot by the action of decomposers. **5.** Composting is a method of waste management in which a pit is dug, and the biodegradable wastes are thrown in and covered with soil. The bacteria and fungi present in the soil decompose the wastes and restores the nutrients to yield manure or compost. **6.** Degradation is the processes by which substance are broken down by tiny organisms called decomposers. **7. Reuse :** Find alternate use of discarded things. Use the empty cold drink bottles to carry water. At home, empty jars and bottles can be used to store the dry foods. **Recycle :** Metals, plastic and glass materials are picked from the garbage and then again reprocessed to make new things. This is called recycling. For example, old plastic bottles are recycled to make polythene bags. **8.** Every year some 45,000 tons of plastic waste are dumped into the world's oceans. One of the results of this is that up to one million seabirds and one hundred thousand marine mammals are killed each year by plastic trash such as fishing gear, six-pack yokes, sandwich bags, and styrofoam cups. **F. 1.** The people who collect garbage from homes dump it in the big local garbage

disposing area. From there the garbage is taken to a site called a landfill. To make a landfill, a huge open area is selected outside a town or a city. It is then dug up and a layer of clay and plastic is spread on its base. This layer prevents the harmful substances to leak into the ground below. The garbage is dumped into this pit. Then, the garbage is segregated. The useful components are removed from the garbage by people. Rest of it is spread inside of the pit and covered with a layer of soil. Every day the same process is repeated and the garbage is disposed in a new compartment called cell. The cells are compressed by bulldozers to create space for more cells in the landfill. Once the landfill is full, it is covered with a thick layer of soil and made into a park. For 20-25 years, no building is made over it. Gradually, the garbage decomposes and mixes with the soil. **2.** Waste can be of three types based on the nature of wastes produced—gaseous, liquid or solid.

Gaseous wastes are released by vehicles and industries.

Liquid wastes are produced in our homes and industries.

Solid wastes are also produced in our homes, industries and agricultural activities.

Solid waste generated in our homes is domestic waste and is commonly called garbage. Vegetable peels, fruit peels, plastic bags and metallic items are domestic wastes.

Solid wastes are of two types : (i) Biodegradable and (ii) Non-biodegradable

Biodegradable waste: It is acted upon by microorganisms and decomposes into simpler substances, for example, vegetable peels, tea leaves, dried leaves, paper, bread, etc.

Non-biodegradable waste : It does not decompose and remains as such for a long time. Polythene bag, plastic pencil box, glass bottles, iron nails, wires, switches, etc. are non-biodegradable waste.

3. Composting : Biodegradable wastes like fruit and vegetable peels, leaves and farm wastes contain a variety of nutrients. These nutrients can be recycled back to the soil by allowing the wastes to decompose in a compost pit. A pit is dug, and the biodegradable wastes are thrown in and covered with soil. The bacteria and fungi that are present in the soil decompose the wastes and restore the nutrients to yield manure or compose. This method is called composting.

The manure thus obtained is rich in nutrients. Composting is clean, cheap and safe. It considerably reduces the amount of garbage to be disposed. **4.** Landfill : Landfills are large open areas used for solid waste disposal. These areas are usually low-lying areas and are away from the places where people

live. The garbage from the dumps is taken in trucks to landfill areas. It is spread in the landfill area and then covered with soil. Once the landfill area is completely full, it is left as such for a long time, about 20 years or so. Such a long time is required as the waste material decomposes very slowly. Finally the area can be converted into a park or a playground. **5.** Non-biodegradable waste can be managed by practising the concept of 3 R's—Reduce, Recycle and Reuse.

Reduce

We should try to reduce the use of plastics. E.g. Use fountain pens in place of disposable ballpoint pens. Avoid using polythene bags. Only use jute or cloth bags. Instead of paper napkins, use washable cloth napkins.

Reuse

Find alternate use of discarded things. E.g. Use the empty cold drink bottles to carry water. At home, empty jars and bottles can be used to store the dry foods and spices in the kitchen. The empty cans can be used as pots for small plants.

Recycle

Metals, plastic and glass materials are picked from the garbage and then again reprocessed to make new things. This is called recycling. For example, old plastic bottles are recycled to make polythene bags.

6. Advantages of Recycling of Plastics

- It makes surroundings cleaner and healthier, by reducing the amount of wastes it owns into community garbage dumps.
- It leads to reduced consumption of raw materials.
- It saves money.
- It reduces the impact on the environment that waste treatment and disposal has.
- It reduces the amount of energy required to manufacture new products as recycling requires less energy as compared to manufacturing.

HOTS : 1. We need to recycle paper even when it is biodegradable because paper is made from trees. More new paper means more cutting of trees which is harmful for the environment. **2.** Earthworms are found in the soil they help in increasing soil fertility. They are called farmer's friends.