Science

SCIENCE 8

1. Crop Production and Management

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

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

C. **1.** grain **2.** sowing **3.** wooden plank **4.** factories **5.** moisture

D. **1.** Rabi **2.** Weeding **3.** Fertiliser **4.** Animal Husbandry **5.** Baisakhi, Pongal

E. **1.** Seed are sown by using seed drill or broadcasting. **2.** (i) Insecticides are used to destroy insects. DDT (dichloro diphenyl trichloroethane), BHC (benzene hexachloride or gamaxene) and Malathion are some examples of insecticides (ii) Fungicides are used to destroy fungi. Sulphur and many

copper salts are some examples of fungicides. (iii) Rodenticides are used against rodents. **3.** Crop rotation is the method of growing different crops alternately on the same field. **4.** The science of farming including cultivation of the soil and rearing of animals is called agriculture. The term agriculture has been derived from the Latin words ager meaning field, and culture meaning cultivation. **5.** Before sowing the seeds, it is important to prepare the soil. It is done by ploughing and levelling.

F. **1.** (i) Preparation of soil (ploughing, levelling, manuring) (ii) Sowing (iii) Applying manures and fertilisers (iv) Irrigation (v) Weeding (vi) Protection of crops from pests and microorganisms (vii) Harvesting, threshing and winnowing (viii) Storage **2.** Seeds need water (in the form of moisture) to germinate. Plants need water to draw nutrients from the soil, for their growth and for making food by photosynthesis. To maintain the moisture of the soil for healthy crop growth, the fields should be watered at proper intervals. The watering of crops at different intervals is called irrigation. Once the water is lifted up, methods to use the water economically have been developed these days. Two of these methods are sprinkler system and drip system. Sprinkler system is used where the soil cannot retain water for long or where sufficient water is not available. Rotating nozzles are attached to perpendicular pipes at regular intervals. Water gets sprinkled on crop as if it is raining. Drip system is an economical method of irrigation. This system involves providing water drop by drop at the roots of the plants, thus water is not wasted. **3. (i) Crop rotation :** One method of replenishing the soil with nutrients is by crop rotation. Crop rotation is the method of growing different crops alternately on the same field. For example, the farmers grow crops like wheat or barley in the first year. This is followed by growing leguminous plants like pea or soyabean in the next season. Leguminous plants help in the replenishment of soil with nitrogen. **(ii) Leaving the field fallow :** It is the process of leaving the field uncultivated (fallow) for one or more seasons. Fallow land will regenerate the lost nutrients. However, due to high demand of food grains this method is no longer followed. **4.** Along with crop plants, many unwanted plants germinate and grow in the fields. These unwanted plants are called weeds. They compete with crop plants for space, light, water and nutrients. They are removed either manually or with a tool called harrow. The process of removal of unwanted plants (weeds) is called weeding. Two weeds are Bull thistle and garlic mustard. Common weedicides are 2,4-D (2,4-dichlorophenoxy acetic acid) and MCPA (2-methyl-4-chloro-1-phenoxy acetic acid). **5.** Fertilisers are chemical substances that contain inorganic salts, that is, minerals needed for plant growth. The nutrients they supply are nitrogen (N), phosphorous (P) and potassium (K). They are available either as a 'compound' fertiliser containing a mix of the three major

nutrients in varying proportions as in the NPK fertiliser or as a fertiliser with one major nutrient in it like potash and superphosphate.

Hots

1. Wheat is a rabi crop grown in winter season. It does not require too much water for its growth. If wheat is sown in kharif season, the crop may wilt as it cannot tolerate excess water. **2.** Farmers grow different crops in a field because different crops may vary in nutrient requirements. This ensures complete and uniform utilization of nutrients present in soil. In this way, it prevents the soil from being deficient of a particular nutrient.

2. Microorganisms : Friends and Foes

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

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

C. **1.** dehydration, pickling, refrigeration, canning **2.** anaerobic **3.** microscope **4.** Diarrhoea, bleeding **5.** nitrification

D. **1.** Vaccine **2.** Communicable **3.** Food preservation **4.** Bacteria **5.** Nitrogen fixation

E. **1.** It is the process of removing water from fruits and vegetables. It results in the decrease of moisture content. Sun-drying is an old method of preserving food materials such as vegetables, fish, meat, etc. **2.** Streptomycin, aureomycin and chloromycetin are obtained from bacteria. **3.** The symptoms of food poisoning are : (a) Frequent vomiting (b) Diarrhoea for more than three days (c) Extreme abdominal pain. **4.** These are unicellular organisms found everywhere on Earth. They are also found inside our body. They differ in their shape and size. **5.** The fungi are heterotrophs. They cannot make their own food like the other green plants do. Fungi have extracellular digestion by secreting enzymes into environments and absorbing the nutrients produced. They store their food as glycogen.

F. **1.** The organisms which are too small to be seen by the naked eyes and can be seen only through a microscope are called microorganisms or microbes. There are five major groups of microorganisms. These are as follows. (i) Bacteria (singular : bacterium) (ii) Fungi (singular : fungus) (iii) Protozoa (singular : protozoan) (iv) Algae (singular : alga) (v) Viruses **Bacteria :** These are unicellular organisms found everywhere on Earth. They are also found inside our body. They differ in their shape and size. **Fungi :** Fungi are non-green plants. They include moulds, rusts and puffballs. They have similarity with the plants due to presence of cell wall but they do not have chlorophyll hence they cannot prepare their own food. **Protozoa :** Protozoa are simple, minute, unicellular microscopic animals. The word protozoan

means the first animal. **Algae :** Algae are plant-like organisms which contain chlorophyll. Algae may be unicellular or multicellular, filamentous or branched. They may be green, red or brown in colour depending on the pigment which they contain. **Viruses :** Viruses are the smallest known living things. They can be seen with the help of electron microscope. They were first discovered by Dmitri Ivanovsky in 1892. Viruses have an important position in the comparative study of living and non-living things as they are an entity that shares the characteristics of both. **2.** Vaccines consist of killed or modified microbes, parts of microbes that trick the body into thinking an infection has occurred. Vaccines are like a training course for the immune system. They prepare the body to fight disease without exposing it to disease symptoms when foreign invaders such as bacteria or virases enter the body, these vaccines fight against these. **3. (a)** (i) The bacterium, Lactobacillus promotes the formation of curd from milk. (ii) Certain bacteria living in the intestine of herbivorous animals like cows, buffaloes, etc. produce enzymes which act upon cellulose and help in its digestion. **(b)** (i) Many well-known antibiotics are obtained from fungi. Penicillin is obtained from the fungus Penicillium notatum. Griseofulvin is extracted from the fungus Griseofulvin. (ii) The wine (brewery) and bread (bakery) industries are the two most important industries which make use of the fungus yeast. Both these industries are based on fermentation activity of yeast. **(c)** (i) Blue-green algae create suitable conditions for the growth of other organism. (ii) Many blue-green algae provide food to several aquatic animals. Spirulina is used as human food. (iii) Some blue-green algae (Lyngbya) produce antibiotics. **4.** The circulation of nitrogen through the living and non-living components of the biosphere (air, soil, water, plants and animals) is called nitrogen cycle. Nitrogen cycle maintains the percentage of nitrogen in the atmosphere more or less at a constant. Nitrogen and oxygen combine in the atmosphere during lightning to form nitrogen oxides. The same happens during combustion in factories or in engines of motor vehicles. These oxides react with rainwater to form dilute nitric acid. The nitric acid reacts with minerals in the soil to form nitrates. Plants take in these nitrates through their roots and convert them into proteins. Animals obtain proteins they need by eating plants or by eating the flesh of other animals. When plants and animals eventually die, the nitrogen compounds are broken down to give ammonia. This process is known as ammonification. Nitrifying bacteria convert ammonia into nitrates. This process is called nitrification. Nitrates may be stored in humus or leached from the soil and carried to lakes and in streams. They may also be converted to free nitrogen denitrifying bacteria through a process called denitrification, and returned to the atmosphere. **5.** Food preservation offers the following advantages : (i) It decreases the food wastage. (ii) It increases the storage period (shelf-life) of perishable food

materials. (iii) It ensures the availability of out-of-season food materials. (iv) It ensures the availability of perishable food materials even at distant places.

G.

Name of the Scientist	Year	Contribution
1. Robert Hooke	1665	Observed cork cells, bacteria and spermatozoa using his own crude microscope.
2. Anton Van Leeuwenhoek	1676	First to describe and sketch microbes
3. Louis Koch	1857-59	Discovered that fermentation is caused by yeast (fungi), disproved the theory of spontaneous generation.
4. Robert Koch	1882	Gave the Germ theory of disease; tuberculosis is caused by mycobacterium, tuberculosis bacterium and anthrax by Bacillius anthracis (1875).
5. Christian Gram	1884	Developed Gram stain technique.
6. Shibasaburo Kitasato	1889	Tetanus disease is caused by clostridium tetani bacterium.
7. Alexander Fleming	1929	Developed antibiotic penicillin from Penicillium notatum (fungus).

HOTS

1. The causative organism is usually a virus, bacteria, fungus, parasite, or rickettsia, which when it enters the host's body, can lead to or cause disease in the host. **2.** It is because common salt is usually used as preservative in pickels as it checks the growth of bacteria in them.

3. Synthetic Fibres and Plastics

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

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

C. **1.** sweat **2.** polymer **3.** can **4.** polyvinyl chloride **5.** thermosetting

D. **1.** Rayon **2.** Plastic **3.** Teflon **4.** Polymer **5.** Silk

E. **1.** Rayon, Nylon **2.** A material which cannot be decomposed by microbes is called non-biodegradable. Almost all the plastics which we use are non-biodegradable. **3. Thermosetting plastic :** (i) Thermosetting plastics are the polymers in which chains get highly cross-linked on heating. (ii) Once moulded, thermosetting plastics cannot be reprocessed. Example : Bakelite, Melamine-formaldehyde resin. **Thermoplastic :** (i) Thermoplastics are long chain polymers with no cross-linking. Heating also does not produce any cross-linking between the chains. (ii) Thermoplastics can be processed

repeatedly. Example : Polythene, PVC, Polystyrene, Nylon, Polyesters, etc. **4.** (i) It is widely used for making fabrics for suits, jackets, shirts, trousers, sarees and other dress materials. (ii) It is used for making sails for boats. **5.** A synthetic fibre is made up of a long chain of small units called monomers joined together to form a polymer. A polymer consists of large number of monomer units. The process of linking monomer units to form polymers is called polymerization.

F. **1.** Any synthetic material which can be easily moulded into any desired shape on heating is called plastic. Plastic is also a polymer like the synthetic fibres. In some plastics, the arrangement of monomers is linear whereas in others it is cross-linked. Some common plastics are: (i) Bakelite (ii) Nylon (iii) Terylene (iv) Polythene (v) Polyvinyl Chloride (PVC), etc. **2. Advantages of Synthetic Fibres :** (i) They are strong. (ii) They are crease resistant. **Disadvantages of Synthetic Fibres :** (i) They do not allow air to pass freely through them and hence are not good for summer. (ii) They do not absorb sweat as natural fibres do. **3. (a)** (i) Nylon fibre is most extensively used fibre in the investigation and it is one of the most widely used artificial materials. (ii) Nylon is the strongest material. Because of this reason it is extensively used in rope making. (iii) Nylon fibre is also used in packing material. (iv) Nylon is used in making bath sponges, toothbrush and parachute. These are also called bath puffs. (v) All waterproof clothes, like raincoats, hats, leggings are made up of nylon. **(b)** (i) In the textile industry for making fabrics. (ii) In the manufacture of carpets. (iii) For the manufacture of tyre cord. (iv) For making bandages and surgical dressings. **(c)** (i) It is rolled between rollers to produce PVC sheets. (ii) It is used as insulating covering for electrical wiring. (iii) It is used for making gramophone records and refrigerator linings. (iv) It is used for making hand bags, raincoats and floor covering materials and covering for suitcases. **(d)** (i) It is used as a lubricant, especially, in those parts of machine, where oil cannot be easily applied. (ii) It has anti-stick properties. It is coated on the surface of baking or frying utensils. **(e)** (i) It is used for making thin films which are used for making carry bags, adhesive tapes, etc. (ii) It is used as anti-corrosion coating on the articles made from iron or copper. (iii) It is used as insulation for electric wires. (iv) It is used for making kitchen and laboratory ware, such as cups and bottles. **4.** A plastic substance which can be moulded again and again into different shapes is called a thermoplastic polymer. Polythene and PVC are common examples of thermoplastics. **Uses :** (i) Polythene is used for making thin films which are used for making carry bags, adhesive tapes, etc. (ii) PVC is used as insulating covering for electrical wiring. A plastic substance which does not soften much on heating and can be moulded only once is called a thermosetting plastic. Thus, softening and moulding are irreversible. Bakelite and melamine are common

thermosetting plastics. **Uses :** (i) Bakelite is used for making plugs, switches, telephone cases and other electrical fittings. (ii) Melamine is used for making unbreakable dinner-ware, and decorative objects. **5.** The problems associated with the excessive use of plastic are : (i) Soil pollution (ii) Blockage of drains and sewer lines (iii) Death of animals that happen to chew these bags along with the food wrapped therein (iv) Reduces the percolation of water into the soil. (v) Use of recycled plastic bags to keep food items is harmful for health. (vi) Burning of plastic releases poisonous gases into the atmosphere causing air pollution. (vii) It reduces the percolation of water into the soil and prevents replenishment of groundwater. (viii) Dumping of plastic goods in water bodies poses a threat to aquatic life. **Measures to Control Problems Caused by Plastics :** (i) Avoid the use of plastic carry bags as far as possible because these are major sources of pollution. Make use of bags made of cotton or jute when you go for shopping. (ii) The biodegradable and non-biodegradable wastes should be collected separately and disposed of separately. Practise this in your homes. (iii) Do not throw plastic wrappers carelessly on road. These are ultimately carried to city sewage system, where they cause clogging. (iv) As a responsible citizen remember the 4R's principle.

G.

Fibre	Comfort	Tensile strength	Shrinkage	Crease retention	Moth attack
Cotton	high	low	high	low	high
Wool	high	very low	very high	good	very high
Nylon	low	high	low	good	low
Polyester	very low	very high	very low	very good	very low

HOTS

1. High Density Polyethylene plastic is the jugs, detergent and oil bottles, toys and some plastic bags. **2.** Melamine is highly stable and can resist high temperature exposure as well as physical and chemical degradation. Melamine is also a flame retardant and also possesses properties like hardness, scratch and moisture resistant.

4. Metals and Non-Metals

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

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

C. **1.** metal oxides **2.** non-metal, good **3.** acidic, neutral **4.** ductile **5.** precious

D. **1.** Metal **2.** Sodium/potassium **3.** Displacement reaction **4.** amphoteric oxide **5.** Rusting

E. **1.** This means that metals can be drawn into thin wires. Silver and gold can be drawn into very thin wires.

2. Sodium : Sodium (2Na) + Water (H_2O) (cold) ⟶ Sodium hydroxide (2NaOH) + Hydrogen (H_2)

3. The oxides of metals are generally basic in nature. When dissolved in water, metal oxides give alkaline (or basic) solutions which turn red litmus blue. The oxides of non-metals are generally acidic in nature. When dissolved in water, non-metal oxides give acidic solutions which turn blue litmus red.

4. Magnesium + Water ⟶ Magnesium hydroxide + Hydrogen

5. Sonorous metals can be used to make musical instruments and bells.

F. **1.** A pure substance that consists of only one kind of atom is called an element. The smallest unit of an element is atom. Elements cannot be broken down into smaller units. The elements are said to be the basic unit and building blocks of a variety of substances. Some commonly used metals, non-metals and metalloids are given below. **(i) Metals :** Iron, Copper, Gold, Silver, Aluminium, Zinc, Lead are some commonly used metals. **(ii) Non-metals :** Hydrogen, Oxygen, Nitrogen, Carbon, Sulphur, Phosphorus, Bromine, Iodine are commonly used non-metals. **(iii) Metalloids :** Boron, Silicon, Arsenic and Germanium are some metalloids.

2. Differences between Physical Properties of Metals and Non-metals

S.No.	Property	Metals	Non-metals
1.	Density	They usually have high density.	They usually have low density.
2.	Malleability	They are malleable.	They are non-malleable and brittle.
3.	Conductivity	They are good conductors of heat and electricity.	They are poor conductors of heat and electricity except graphite.
4.	Sonority	They are sonorous.	They are non-sonorous.
5.	Physical state	They are solid at room temperature except mercury (Hg) which is a liquid.	They are either solids or gases except bromine which is a liquid.
6.	Ductility	They are ductile.	They are non-ductile.
7.	Melting and boiling points	They have high melting and boiling points, except Na and K.	They have low melting and boiling points except graphite.
8.	Metallic lustre	They are lustrous (shiny).	They are non-lustrous or dull.
9.	Hardness	They are hard except Na and K which are soft metals.	They are soft except diamond which is hard.
10.	Tensile strength	They have high tensile strength.	They have low tensile strength.

3.

Property	Metals	Non-metals
Reaction with oxygen	Metals form basic oxides with oxygen.	Non-metals form acidic or neutral oxides with oxygen.
Nature of oxides	Metal oxides are basic in nature.	Non-metals oxides are either neutral or acidic in nature.
Reaction with water	Active metals like sodium react violently with water at room temperature forming corresponding hydroxide and hydrogen gas.	Non-metals do not displace hydrogen from acids.
Reaction with acids	Active metals such as sodium, zinc, magnesium displace hydrogen from acids.	Non-metals do not displace hydrogen from acids.
Reaction with alkalis	Certain metals, such as zinc, aluminium, react with hot solution of alkalis liberating hydrogen gas.	The reactions of non-metals with alkalis are complex.
Displacement reaction	More active metals displace less active metals from their salt solutions.	Certain more reactive non-metals displace less reactive non-metals from their salt solution. *For example,* chlorine displaces bromine from bromides and iodine from iodides.

4. Reactivity Series of Metals : On the basis of the vigour of the reactions with the various chemical reagents such as oxygen, water and acids as well as displacement reactions, the metals have been arranged in a series in the decreasing order of their reactivity. This arrangement of metals in a series in decreasing order of their reactivity is called activity or reactivity series of metals. The reactivity series of metals is also known as activity series of metals. In the reactivity series, the most reactive metal is placed at the top whereas the least reactive metal in placed at the bottom. The more reactive metal has greater tendency to form compounds. So, such metals are found only in the form of their compounds. Less reactive metals such as silver, gold and platinum are found in free state in Earth's crust.
5. (a) Malleability means that metals can be hammered into very thin sheets. **(b)** Lusture is a property of a metal that gives shiny surface to a metal. **(c)** Sonority is the characteristic of a metals which means that they produce a ringing sound when struck. **(d)** Elements which show the properties of both metals and non-metals are called metalloids. **(e)** Brittle is the property of non-metal which means that they break up into pieces when pressed hard or hammered.

G.

Metal	Ore	Chemical formula
Copper	Copper pyrite (Chalcopyrite)	$CuFeS_2$
	Copper glance (Chalcocite)	Cu_2S
	Cuprite	Cu_2O
	Malachite	$Cu_2CO_3(OH)_2$

Aluminium	Bauxite Cryolite Diaspore	$Al_2O_3.2H_2O$ Na_3AlF_6 $Al_2O_3.H_2O$ or AlO (OH)
Iron	Haematite Magnetite Iron pyrite	Fe_2O_3 Fe_3O_4 FeS_2
Zinc	Zinc blende Calamine	ZnS $ZnCO_3$
Lead	Galena	PbS
Tin	Cassiterite or tin stone	SnO_2

HOTS

1. Mercury is used in thermometers because it has high coefficient of expansion. Hence, the slightest change in temperature is notable when it is used in a thermometer. **2.** The reason is because unlike metals, non-metals do not have a tendency to lose electrons but to gain electrons. Metals have a tendency to lose electrons. These electrons, which are readily lost by reactive metals like sodium, potassium etc. are accepted by hydrogen ions of the acids, reducing them to hydrogen gas (H_2).

5. Coal and Petroleum

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

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

C. **1.** Earth **2.** decomposition **3.** natural **4.** Anthracite **5.** millions

D. **1.** Carbonisation **2.** Destructive distillation **3.** Refining **4.** Natural gas **5.** Fossil fuels.

E. **1.** Its name is derived from the Latin word, Petra-rock and Oleum-oil. Thus, petroleum means rock oil. Petroleum or oil is a liquid form of a fossil fuel. Petroleum has not only become world's leading fossil fuel but its products have almost become indispensable for the people on Earth. It is a thick dark combustible liquid made up of hydrocarbons that are compounds containing only hydrogen and carbon. **2.** The fuels which were formed by the decomposition of the remains of prehistoric plants and animals buried under the Earth millions of years ago are called fossil fuels. Examples: coal, petroleum, natural gas, etc. **3.** The slow chemical process of the conversion of wood into coal is called carbonisation. Carbonisation is a very slow process and may have taken thousands of years to take place. **4.** Inexhaustible natural resources are those which are present in unlimited quantity in nature. They cannot be exhausted by human activities. They are also known as renewable resources. Exhaustible natural resources are those

which are present in limited quantity in nature and are likely to get exhausted over a certain period of time. They are also known as non-renewable resources. **5.** CNG is now being used as a fuel for automobiles like cars, buses, scooters, etc.

F. **1.** Petroleum (crude oil) consists of a large number of saturated hydrocarbons mixed with sea water, and silt (fine clay). It cannot be used as such. However, petroleum can be separated into several useful products by fractional distillation. Fractional distillation is a method of separating a mixture of substances with different boiling points to obtain a number of components with similar boiling points. These components are called fractions. **2.** Destructive distillation of coal consists of heating it strongly in the absence of air. Some of the products obtained by destructive distillation of coal are coke, coal tar and coal gas. **3.** (i) Do not waste or misuse fossil fuels. (ii) Use these fuels only when absolutely necessary. (iii) Adopt and use alternative or renewable sources of energy such as solar, wind, and biomass energy. It is better to use biogas as a domestic fuel than the fossil fuels. (iv) Use room heaters, coolers and other such things only when absolutely needed. (v) Use solar cookers, heaters and dryers wherever possible. (vi) Use CFLs and fluorescent lights which consume less energy, instead of incandescent lamps. **4.** Coal was formed by the decomposition of plants and trees buried under the surface of the Earth long-long ago. It is believed that millions of years ago, due to earthquakes, flood and volcanic activities, the forest were buried under the surface of the Earth and were covered with sand, clay and water. Wood under the effect of high temperature and pressure and in the absence of air, gets converted into coal through a number of steps, each step leading to an increased carbon content. The sequence of changes is : Wood Peat Lignite Bituminous coal Anthracite. **5.** The burning of fossil fuels releases harmful gases like oxides of sulphur and nitrogen into the atmosphere, which are known to be very poisonous gases and are regarded as very harmful pollutants. These gases are also the primary reason for greenhouse effect. Burning of fossil fuels also releases smoke and particular matter into the atmosphere. It also releases carbon dioxide and carbon monoxide into the atmosphere.

G.

Fraction	Boilling point range	No. of carbon atoms in a chain	Uses
Petroleum gas	Less than 40°C	1-4	Fuel (liquefied petroleum gas, LPG)
Naphtha and petrol	40°C-150°C	4-10	Chemicals for plastics and insecticides; Fuels for cars
Kerosene	150°C-240°C	10-16	Jet fuel; Household fuel
Diesel oil	220°C-350°C	16-20	Automobile fuel

Lubrication oil	Above 350°C	20-30	Polishes and waxes; Lubricating oil for machinery
Fuel oil	Above 500°C	30-40	Fuel for ships and power stations
Residue	Solid	>40	Paraffin wax; Asphalt for roads

HOTS

1. (a) It causes less pollution and has more efficiency. **(b)** CNG fuel systems are sealed, which prevents any spill or evaporation losses. **(c)** CNG-powered vehicle have lower maintenance costs when compared with other fossil fuel-powered vehicles. **2.** Because we are in danger of running the planet's climate through carbon dioxide emissions. If we continue to use fossil fuels, we may increase the temperature of the planet in ways that will harm us and our entire ecosystem. Also, we cannot keep using fossil fuels forever. They will eventually ran out even as the population of Earth grows.

6. Combustion and Flame

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

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

C. **1.** calorific value **2.** ignition **3.** no **4.** Water, glass **5.** three

D. **1.** Combustion **2.** Oxygen **3.** Incomplete combustion **4.** Non-luminous **5.** Zone of incomplete combustion.

E. **1.** Combustion takes place only : (i) In the presence of a combustible substance (ii) In the presence of oxygen (air) **2.** The rainwater containing dissolved oxides of nitrogen and sulphur is called acid rain. The acid rain is very harmful to both living and non-living. Some harmful effects of acid rain are given below : (i) Acid rain promotes corrosion of metallic structures. (ii) Acid rain is highly acidic and corrosive. **3.** Ignition temperature means the lowest temperature in which a thing catches fire. As a result when we try to fire a wood it catches fire with the help of kerosene and paper or any other thing which have low temperature but when we try to burn a CNG it catches the fire quickly that means the CNG has low ignition temperature than the wood. **4.** Calorific value of a fuel can be defined as the amount of heat liberated when one kilogram of the fuel is completely burnt in sufficient supply of oxygen. The higher the calorific value, the better is the fuel. **5.** The red-coloured cylinders used as fire extinguishers either have carbon dioxide stored under high pressure or have stored chemicals that react to release carbon dioxide.

F. **1.** Combustion takes place only : (i) In the presence of a combustible substance (ii) In the presence of oxygen (air) (iii) On attainment of ignition

temperature. If any of these conditions is not met, combustion does not take place. **2.** (i) It should have a large calorific value. (ii) It should be cheap and readily available. (iii) It should not produce gases which pollute the air. (iv) It should not produce any hazard during transportation. (v) It should burn at a slow rate and its combustion should be controllable. **3.** The red-coloured cylinders used as fire extinguishers either have carbon dioxide stored under high pressure or have stored chemicals that react to release carbon dioxide. The following three types of fire extinguishers are commonly used. **Dry powder fire extinguisher :** It contains sand and baking soda. When this mixture is thrown over fire, baking soda decomposes to release carbon dioxide which extinguishes the fire. **Soda-acid fire extinguisher :** It consists of a small glass bottle filled with sulphuric acid that is supported in a strong iron vessel containing sodium bicarbonate solution. On striking the knob, the bottle containing acid breaks and carbon dioxide is liberated by the action of the acid on baking soda. **Foam type fire extinguisher :** In this extinguisher, a solution of aluminium sulphate is taken in the glass bottle instead of sulphuric acid. It releases a foam of carbon dioxide that surrounds the burning substance and cuts off its air supply. This type of fire extinguisher is especially used to extinguish oil fires. **4.** Carbon dioxide, carbon monoxide, oxides of sulphur, oxides of nitrogen, unburnt carbon particles, soot, ash, smoke, etc. are produced when fossil fuels are burnt completely or incompletely. The harmful effects of these various pollutants on our environment are summarized below.

Air pollutant	Effects
1. Dust	Allergic reactions
2. Smoke	Respiratory problems
3. Carbon monoxide	Respiratory problems, may even lead to death
4. Carbon dioxide (excess)	Greenhouse effect: atmospheric temperature rises
5. Oxides of sulphur	Damage lungs, produce acid rain and cause corrosion
6. Oxides of nitrogen	Lung congestion, produce smog

5. Non-luminous Zone or the Zone of Complete Combustion : The outermost zone of the flame is called the non-luminous zone. Complete combustion takes place here as the wax vapour can get oxygen from the air. This is the hottest zone and is faintly visible. **Zone of Incomplete combustion : The Luminous Zone :** In this zone, the wax vapour do not burn completely as the supply of air is inadequate for complete combustion. The wax breaks up into carbon and hydrogen. The unburnt carbon particles glow and impart a pale yellow colour to the flame. This is the middle part of the flame and is moderately hot. **Dark Zone or Zone of**

no Combustion : Around the wick, there is a zone which is black in colour and is called the dark zone, where there is no combustion. In this area, no oxygen is available for the burning to take place. **Blue Zone :** It lies at the bottom of the flame. The blue colour is due to the burning of carbon monoxide produced due to the incomplete combustion of carbon particles.

G. **Air pollutant :** (i) Dust (iv) Carbon dioxide (excess) (vi) Oxides of nitrogen. **Effects :** (ii) Respiratory problems (iii) Respiratory problems, may even lead to death (v) Damage lungs, produce acid rain and cause corrosion.

HOTS

1. Room temperature is generally considered as 25 degree Celsius. If the ignition temperature is lower than the room temperature then it will burn spontaneously i.e. no external substance is required to burn the fuel. This kind of combustion is known as spontaneous combustion. **2.** In order for a fire to burn, all three elements of the fire triangle must be present : heat, fuel and oxygen. If any one is cut off the fire will be put out. As the fire blanket completely surrounds the person whose clothes caught fire, it seals the person's body surface around the fire and cut's off the oxygen supply to the fire, thereby putting it out. Hence fire blanket acts as a fire extinguisher and stops the fire from spreading.

7. Conservation of Plants and Animals

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

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

C. **1.** Gujarat **2.** threatened **3.** fauna **4.** Uttarakhand **5.** Wildlife sanctuary

D. **1.** Conservation **2.** Biosphere reserves **3.** Wildlife sanctuary **4.** Vulnerable **5.** Afforestation

E. **1.** The species of plants and animals which are found exclusively in a place or biota are called the endemic species. Endemic species are unique to that place or region and not found naturally anywhere else. Some species endemic to India are : (i) Lion-tailed Macaque (Western Ghats) (ii) Malabar Parakeet (Malabar region) (iii) Nilgiri Langur (Nilgiri hills) (iv) Nilgiri Tahr (Nilgiri hills) (v) Great Indian Bustard. **2.** (i) the increased demand of wood and timber (ii) the lowering of water-table (iii) forest fires. **3.** A biosphere reserve is designed to provide protection to the wild flora and fauna, the domesticated animals and plants, as well as to the traditional lifestyles of the tribals of the area. An area which is strictly reserved for the protection of animals is called a wildlife sanctuary. The wildlife sanctuary also provides suitable living conditions to the wild animals. **4.** Conservation of wildlife involves the protection, preservation, perpetuation and judicious

control of population of rare species of plants and animals in their natural habitats. **5.** People go for hunting to kill animals for their meat, skin and other body parts.

F. **1.** A biosphere reserve is designed to provide protection to the wild flora and fauna, the domesticated animals and plants, as well as to the traditional lifestyles of the tribals of the area. At present, there are 13 biosphere reserves in India. Some biosphere reserves set up in our country are : (i) Nilgiri (ii) Nandadevi (iii) Nokrek (iv) Manas (v) Sunderbans (vi) Pachmarhi (vii) Kanchenjunga. A biosphere reserve may also contain other protected areas in it. **2.** The Project Tiger conservation programme was initiated in 1973, for the purpose of saving the tiger population from extinction in India. The first ever all India tiger census was conducted in 1972 which revealed the existence of only 1827 tigers. The project of conservation of tiger population was launched by the Government of India with the help of international agencies, like World Wildlife Fund, etc. Nine tiger reserves in nine states with a total area of 13,017 sq. km were set aside with a tiger population of about 300. The main achievements of this project are excellent recovery of the habitat and consequent areas, from a mere 268 in 9 reserves in 1972 to 1576 in 27 reserves in 2003. **3.** Some of the major causes of loss of wildlife are as follows : (i) Increase in human population and use of land for agricultural and urban development have led to a large-scale destruction of forests. This causes loss of habitat of wildlife. (ii) Pollution of air, water and land adversely affects many plants and animals. (iii) Climatic changes (e.g. global warming) due to natural and human-made reasons have also forced species to adapt to the changing environment. Those that are not able to adapt to changing environment die. (iv) Killing of animals for their meat, skin and other body parts. (v) Natural disasters, such as earthquakes, floods, droughts, cyclones and hurricanes also contribute to the reduction of plant and animal species in many areas. **4.** (i) Strict laws have to be framed and enforced to check poaching, illegal hunting and trade of animal products. (ii) Restoration of forests, fields, grassland and swamps should be ensured. (iii) Unnecessary destruction of wildlife should be prevented by educating people. (iv) Wildlife sanctuaries and national parks should be made keeping in mind the feeding, breeding and environmental needs of the species concerned. (v) Regulation and control on fishing, hunting, and collection of wild products from the forests should be enforced. **5.** Wildlife provides source material for breeding improved varities of crops, plants and animals. Scientists and medical researchers use wild animals as research material on which final experiments are performed before their actual application to human beings. Wildlife is an essential component of various food chains, food webs, biogeochemical cycles and energy flow through different trophic levels.

Thus, the various services provided by the wildlife are vital for the sustenance of life on the Earth.

G. Do it yourself.

HOTS

1. Bulls getting charged at red colour is a myth. In fact bulls are colour blind. It is the irritating motion of the flag or things which makes bull angry, not the colour as such. **2.** Zoos are the areas where animals are kept in special enclosures or cages with restricted area. They serve as an amusement places for public. National parks are the reserved places used to protect flora and fauna of an area. They are large and diverse reserves which help in protection of different ecosystems. They protect animals from getting extinct.

8. Cell : Structure and Functions

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

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

C. **1.** Nucleus **2.** cell wall **3.** powerhouses **4.** Lysosomes **5.** Living

D. **1.** Microorganisms **2.** Cell membrane **3.** Mitochondria **4.** Cell organelles **5.** Ribosomes

E. **1.** All living things are made up of tiny living parts called cells. Cells are the 'building blocks of life'. Houses are made up of bricks stuck together. Similarly, plants and animals are built up of cells stuck together. **2.** Do it yourself. **3.** Nucleus is the most important part of a cell. It is usually spherical or oval in shape. It controls all the vital functions of the cell. It regulates metabolic activities and transmits. **4.** Mitochondria. **5.** The function of a centrosome is to organize microtubules and provide structure for the cell, as well as pull chromatids apart during cell division.

F. **1. Plant Cell :** (i) It has a rigid, nonliving cell wall. (ii) It usually has one or two large vacuoles.(iii) Plastids are present. (iv) Centrosomes are absent. (v) Lysosomes are absent. **Animal Cell :** (i) No such wall is present. (ii) Vacuoles are either absent or are smaller in size. (iii) Plastids are absent. (iv) Centrosomes are present. (v) Lysosomes are present. **2.** Do it yourself. **3.** Chromosomes are thread-like structures located inside the nucleus of animal and plant cells, composed of nucleoprotein DNA (deoxyribo-nucleic acid). The hereditary units of chromosomes are the genes. They are responsible for the transmission of characters from the parents to the offsprings. It is on account of these genes that a child resembles its parents. **4.** Usually, the sample that has to be viewed under a microscope is placed on a rectangular piece of glass called a slide, with a drop of fluid. It is then covered with a thinner piece of glass called the

cover slip. The electron microscope is a more recent discovery that can magnify objects much more than a normal microscope. Electron microscopes have revealed the fascinating world inside the cell. **5.** Mitochondria (singular mitochondrion) are small rod-like structures, sometimes called the powerhouses of cells. They contain enzymes that release energy from food. Almost all the energy received or required by the cell is generated by mitochondria and hence they are called so.

G. **Type of cells in which it is present :** (i) Plant (ii) Animal and Plant (iii) Animal and Plant (iv) Animal and Plant (v) Animal and Plant (vi) Animal and plant (vii) Generally in Animal (viii) Animal and Plant (ix) Animal and Plant (x) Animal and Plant (xi) Plant. **Function :** (i) Gives shape and rigidity to the cell. (ii) Metabolic functions of the cell. (iii) Regulates metabolic activities and transmits. (iv) Conduct cell respiration and release of energy. (v) Regulates movement of substances in and out of the cell. (vi) Formation of hormones, secretion, storage of proteins. (vii) Destroy damaged cells and unwanted cell products. (viii) Contains enzymes, helps in protein synthesis. (ix) Store excess material. (x) Site of protein synthesis. (xi) Storage of starch, site of some pigments, helpful in photosynthesis.

HOTS

1. Cells do not die when cell is worn out badly, then lysosomes, an organelle, released the digestive enzyme that eats excess of wornout cell. **2.** Chromosomes are called heredity vehicles because genes are located on the chromosomes in the form of linear array which are responsible for the passage of characters from the parents to the off springs.

9. Reproduction in Animals

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

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

C. **1.** sperms **2.** in-vitro fertilisation **3.** internal **4.** two, foetus **5.** Oviparous

D. **1.** Sexual reproduction **2.** Fertilisation **3.** Viviparous **4.** Foetus **5.** Metamorphosis.

E. **1.** When the fusion of male gametes with female gametes takes place outside the body of the female partner, the fertilisation is called external fertilisation external fertilisation can be seen in frogs. **2.** The process by which living organisms produce offsprings of their own kind is called reproduction. This process helps all living organisms to increase in number by producing young ones of their own kind. **3.** The transformation of the larva into an adult silkworm and that of tadpole into a frog through drastic

changes is called metamorphosis. **4.** The animals which give birth to young ones are called viviparous animals. Cow, buffalo, cat, dog and human beings are the examples of the viviparous animals. The animals which lay eggs which later develop into the young ones are called oviparous animals. Frog, lizard, butterflies, hen and crow are the examples of oviparous animals. **5.** The female egg and the male sperms are extracted and placed in a glass dish in salt solution to fertilise. The embryo is then planted in the woman's uterus and it grows there normally. This is called In-vitro fertilization (IVF vitro in Latin means glass). It is a technique for fertilizing a human egg outside the body. Babies thus produced are often known as 'test-tube babies'.

F. **1. (a)** When the sperm and ovum fuse together, they form the zygote. This is the first cell of the new organism. It goes through specific changes to form the new organism. The process of fusion of the sperm and ovum is called fertilisation. **(b)** There are two ovaries which are situated in the abdominal cavity. These produce one mature ovum each after every four weeks. **(c)** When the sperm and ovum fuse together, they form the zygote. **2.** Do it yourself. **3.** (i) Testes are two in number, and somewhat oval in shape. They lie within the scrotum. The testes produce sperms in very large numbers. (ii) Vas deferens is a narrow duct which helps to transport sperms from the testes. Several fluids are secreted inside this duct by several glands which mix with the sperms to form a fluid called semen. (iii) Urethra transports sperm and urine at different times. (iv) Sex glands produce a liquid that contains nutrients for the sperms. This liquid together with the sperms forms semen. (v) Penis allows urine as well as semen to pass from the man's body into vagina in a woman's body during mating for the purpose of reproduction. Please note that in male (human) there is only one opening for urine and sperms to pass out from the body. (v) **Sperms :** The sexual maturity in human males is attained around the age of 14 to 15 years. Sperms are produced in millions by the testes. They are very small in size. **4.** In amoeba, the nucleus first divide into two nuclei. Then the cytoplasm divides into two parts, each containing a nucleus. A constriction develops in the body which gradually depends to form two daughter amoeba. **5. (i) Ovaries :** There are two ovaries which are situated in the abdominal cavity. These produce one mature ovum each after every four weeks. **(ii) Oviduct or Fallopian Tubes :** It is a muscular tube which joins the uterus with the ovary. It carries the ovum into uterus. **(iii)** Uterus (womb) is a pear-shaped organ where the foetus develops after fertilization. **(iv)** Cervix is a ring of muscle at the lower end of the uterus. It leads to the vagina. The uterus opens into a wide muscular tube called vagina. Sperms are deposited here by the penis during sexual intercourse. It is the passage through which the baby comes out of the womb during childbirth.

HOTS

1. Block fallopian tubes are a major causes of infertility in women. So, a woman with blocked fallopian tubes can't get pregnant. **2.** Dogs and cats release many eggs at a time and they are fertilized by sperms which produce multiple puppies and kitters. Also, survival rate of puppies are very low, so to maintain the survival of species they produce many puppies and kittens at a time.

10. Reaching the Age of Adolescence

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

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

C. **1.** endocrine glands, nervous **2.** menopause **3.** hormones **4.** HIV **5.** menopause

D. **1.** Adolescence **2.** Mammary **3.** Endocrine glands **4.** Menopause **5.** Hygiene

E. **1.** At puberty the voice box or the larynx begins to grow. The larynx in boys is larger than that in girls. The voice box in boys can be seen as the Adam's apple in their throat. **2.** AIDS is a disease which is caused by HIV virus. This virus destroys the natural defence mechanism of the body and makes it susceptible to diseases. It can be prevented in the following ways : (i) Use disposable syringes. (ii) Get blood from registered blood banks for transfusion. **3.** In a frog, the process of metamorphosis is regulated by thyroxine hormone which is produced by thyroid gland. **4.** During adolescence the body grows rapidly and many changes in the body take place. These changes mark the onset of puberty. At puberty, the boys and girls become capable of reproduction. Puberty ends when the adolescent reaches at the reproductive maturity. **5.** The period of transition from childhood to adulthood is called adolescence. The World Health Organisation (WHO) defines adolescence as the period of life between 11 and 19 years of age. Since adolescence period covers the 'teens period', adolescents are usually called teenagers.

F. **1.** If fertilization does not occur, the released egg, and the thickened lining of the uterus along with its blood vessels are shed off. This causes bleeding called menstrual flow. The bleeding in women due to the breakdown of the thickened inner wall of the uterus and its blood vessels is called menstruation. The menstrual flow lasts for 4-7 days. Menstruation occurs once in about 28-30 days. **2.** The basic aim of maintaining personal hygiene is to keep the bacteria and other harmful microorganisms away from entering the body or infecting the food consumed by us. Otherwise diseases can develop. Each individual should take balanced diet to stay healty. **3.** Every human individual, male or female, possesses 23 pairs of chromosomes, of these 23 pairs, 22 pairs of chromosomes are similar in all

aspects. The 23rd pair is different and is called sex chromosome. (i) In males, the sex chromosome consists of one X-chromosome and one Y-chromosome. Thus, the sex chromosome in males is of XY type. (ii) In females, the sex chromosome consists of two X-chromosomes. Thus, the sex chromosome in females is of XX type. (iii) If the father contributes an X chromosome, the baby will be a girl (XX). (iv) If the father contributes a Y chromosome, the baby will be a boy (XY). **4.** AIDS is a disease which is caused by HIV virus. This virus destroys the natural defence mechanism of the body and makes it susceptible to diseases. The ways by which this virus is transmitted from an infected person to a normal person are : (i) sharing the needle of the syringe for injecting drugs. (ii) Through an infected mother to her infant. (iii) Unprotected sexual contact with an infected person. There is no vaccine or medicine for AIDS so far. So as it stands today, AIDS is a preventive disease. How to prevent AIDS : (i) Use disposable syringes. (ii) Get blood from registered blood banks for transfusion. (iii) Have safe and protected sex. (iv) HIV infected mother should not breastfeed her baby. **5. (i) Pituitary Gland :** It is a small, reddish grey gland, about the size of a pea. It weighs about 0.5 gm. It remains hanging from the base of the brain by a short stalk. The pituitary gland is located just below the brain. It is called the master gland because it controls the functioning of all other glands. **(ii) Thyroid Gland :** The thyroid gland is located in the throat region. It makes a hormone called thyroxine which contains iodine. The function of thyroxine hormone is to control the rate of metabolism, growth and respiration. Too little of thyroxine makes a person sleepy and sluggish and causes an increase in body weight. **(iii) Pancreas :** The pancreas is located just below the stomach in the body. Pancreas is both exocrine as well as endocrine. It secretes insulin along with some other hormones. The function of insulin hormone is to control sugar metabolism in the body. **(iv) Adrenal Glands :** Adrenal glands are located just above the kidneys. Adrenal glands produce the hormone adrenalin. This hormone is produced under stress. It increases the flow of blood to the brain.

G.

S.No.	Glands	Hormones secreted	Functions
1.	Pituitary	Growth hormone	It is the master gland which controls the activities of other glands and helps in growth.
2.	Thyroid	Thyroxine	Causes cretinism in children and goitre in adults.
3.	Pancreas	Insulin	Regulates sugar metabolism. Deficiency causes diabetes.
4.	Adrenal	Adrenalin	It helps the body to fight stress.
5.	Testes	Testosterone	Promotes sperm production and devolvement of secondary sex characters.
6.	Ovary	Estrogen	Promotes egg formation and devolvement of secondary sex characters.

HOTS

1. The first menstrual flow begins at puberty and is termed menarche. At 45 to 50 years of age, the menstrual cycle stops. Stoppage of menstruation is termed menopause. The period between menarche and menopause is called the reproductive age. **2.** No, as AIDS is a non-communicable disease.

11. Force and Pressure

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

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

C. **1.** shape, size **2.** contact **3.** Spring balance **4.** decreases **5.** contact

D. **1.** Electrostatic force **2.** Resultant force **3.** Gravitational force **4.** Atmospheric pressure **5.** Pascal's law

E. **1.** Pressure is a measure of the effectiveness of a force. It takes into account the force and the area over which it acts. Pressure is force per unit area applied to an object in a direction perpendicular to the surface. The SI unit of pressure is Pascal (Pa). **2.** When two force acting on an object are not equal in size, we may say that the are unbalance forces. **3.** Contact forces are those which act only when objects are in physical contact with each other and bring about necessary changes. Some forces do not involve physical contact between the bodies on which they act. They act through the space between them. Such forces are called non-contact forces. **4.** The walls of a dam are made thick at the bottom and thin upwards. The pressure at a point inside a liquid depends on the depth of point from the free surface, therefore, the pressure is very high at the bottom of the dam. To tolerate this pressure, the walls of dam are made thick at the bottom. **5.** For the force to come into play, there should be two interacting objects, one on which the force is applied and the other who applies the force. For example, consider a man standing behind a stationary car. Will the car move due to mere presence of the person behind it? Certainly not. Now he pushes the car. The car begins to move in the direction of the force. Thus interaction between the car and man resulted a force to act between the two.

F. **1.** A force is defined as a push or pull that causes some kinds of movement in an object. The force causes an object to move or to slow down, to stop, or to change the direction of the object's motion. The force may have the following effects on it : **(i) Force can make stationary objects move :** Pushing things, pulling things and hitting things are the ways of making things move. The force may have the following effects on it. **(ii) Force can stop the moving objects :** Suppose you are cycling on a straight road at the same speed. Now, if you apply brakes or if your friend pulls your cycle

from behind, what will happen? The cycle will slow down and stop. **(iii) Force can change the speed of many objects :** When a force is applied on a moving object, it can change the speed of a moving object. **(iv) Force can change the direction of moving objects :** There are many activities that show that a force can change the direction of motion of a moving object. During the game of cricket, the batsman changes the direction of the moving ball by touching or striking it with the bat at a suitable angle. **(v) Force can change the shape and size of an object :** Imagine a spring fixed in a wall with a nail. When we pull the spring, it gets stretched and hence, its shape changes. Similarly, when we crumple a paper, its shape changes. **2.** At high altitudes, there is less oxygen available. This makes the air thinner and drier. The climate inside the nose also gets drier because of this. This makes the blood vessels exposed inside the nose more likely to burnt there than at lower altitude. **3.** To one end of the glass tube, tie a small membrane cut from a balloon. Now hold the tube in a vertical position and pour water in it, such that half the tube is filled with water. Observe the bulge produced in the membrane. Now pour more water in the tube, such that three quarters of it is filled with water. You will observe that the bulge produced in the membrane increases. This proves that the pressure exerted by a liquid is directly proportional to the height of the liquid. **4.** School bags have broad straps with which they are carried. Narrow, string-like straps cause severe pain because the weight of the bag acts on a small area and this increases the pressure considerably. **5. (a)** Electrostatic force is a kind of force which can push or pull tiny objects. **(b)** The force exerted by the muscles of a human or animal body is called muscular force. We use our muscular force during walking, running, kicking and lifting certain objects. Animals exert muscular force to do heavy works such as, pulling a cart, ploughing, carrying heavy loads, etc. **(c)** Isaac Newton discovered that gravity is a force that acts at a distance and attracts bodies of matter toward each other. The force of gravity from the Earth on an object is the acceleration of gravity on the mass of the object which is equal to the object's weight. The law of gravity determines how fast objects will fall. **(d)** When an object is sliding or rolling on a surface, a force comes into play between the two surfaces in contact. It tries to stop the object from moving. This force is called the force of friction.

HOTS

1. Water pressure increases with depth because of the increased weight and volume of the fluid above. The pressure a diver experiences at a given depth is the sum of all the pressures above that diver, from both the water and the atmosphere. **2.** Because of Earth’s gravity i.e. gravitational force as the Earth pulls everything towards it with the help of its gravity. **3.** The pressure exerted due to a small surface area is high compared to pressure

due to large surface area. Pressure = Force/Area, which implies an equal force can exert higher pressure on a small area. This is why the cutting edges of tools like knives, blades, etc are provided with sharp edges. The high pressure at the end of these sharp surface can easily pierce through wooden, plastic, etc surfaces.

12. Friction

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

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

C. **1.** roughness **2.** Static friction **3.** graphite **4.** Static **5.** streamlined

D. **1.** Friction **2.** Friction **3.** Roughness **4.** Drag **5.** Lubricant

E. **1.** The force acting along the two surfaces in contact which opposes the motion of one body over the other is called the force of friction. The force of friction is commonly called friction. **2.** The frictional force exerted by fluids (liquids and gases) is called the drag. **3.** Properly shaped bodies (called streamlined) experience less friction from air or water. Bodies of aeroplanes, rockets, ships, etc are streamlined. Birds and fishts also have streamlined bodies. **4.** Tyres of all kinds of vehicles are provided with deep grooves, so as to increase friction. This prevents the vehicles from skidding on the wet roads and sharp turns. **5.** Friction between various parts of machines leads to a loss of energy. Therefore, friction reduces the efficiency of machines. Friction causes wear and tear of moving machine parts. So we can say that the friction is a necessary evil.

F. **1.** The force acting along the two surfaces in contact which opposes the motion of one body over the other is called the force of friction. The force of friction is commonly called friction. Following are the methods employed for reducing friction. **(i) By polishing the surfaces :** Rough surfaces can be made smooth by polishing. Polishing removes 'hills' and 'valleys' from the surfaces. Therefore, polishing of the surfaces reduces the friction. **(ii) By streamlining the body or an object :** Properly shaped bodies (called streamlined) experience less friction from air or water. Bodies of aeroplanes, rockets, ships, etc are streamlined. Birds and fishts also have streamlined bodies. **(iii) Wheels :** If a suitcase is fitted with wheels, it is easier to move it because the friction between the wheels and the ground is less. Thus, wheels reduce friction. **2. (i) Static friction :** The force of friction called into play, which does not allow two bodies to slide upon one another is called static friction. It is a self-adjusting force, that is, only as much is called into play as is necessary to prevent the motion. **(ii) Dynamic friction or sliding friction :** The force of friction acting between the two bodies, when they are sliding upon one another with a uniform speed is called dynamic friction or sliding friction. **3.** There are

various causes of friction. Some of them are as follows : **Surface Roughness :** The most common cause of friction is the roughness of the surfaces of materials being rubbed together. No solid surface is perfectly smooth. However, the degree of roughness varies from surface to surface. Even a surface that appears smooth to the naked eye is actually rough. The surfaces have crests and troughs, cracks and bumps or hills and valleys. These are known as irregularities or imperfections. When a body (say, a wooden block) is pulled over another, these 'hills' and 'valleys' interlock with each other and oppose the relative motion between the two bodies. This gives rise to a frictional force. Thus, friction is due to the roughness of the two surfaces in contact. **Molecular adhesion :** Another kind of friction can be caused by molecular adhesion or attraction. 'Ultra smooth' materials and 'sticky' materials fall in this category. When one body is made to move over the other, the force of adhesion opposes the motion. This force which opposes the motion also gives rise to frictional force. So, the force of adhesion between the two surfaces gives rise to friction. **4. (i) Static friction :** The force of friction called into play, which does not allow two bodies to slide upon one another is called static friction. It is a self-adjusting force, that is, only as much is called into play as is necessary to prevent the motion. The maximum static force of friction called into play, when one body just slides upon another body is called limiting friction. **(ii) Dynamic friction or sliding friction :** The force of friction acting between the two bodies, when they are sliding upon one another with a uniform speed is called dynamic friction or sliding friction. **(iii) Rolling friction :** The force of friction existing between the two surfaces in contact when one of them is rolling over the other is called rolling friction. No, rolling friction is less than dynamic faction. **5.** (i) You could not walk without the friction between your shoes and the ground. Friction holds your shoe to the ground, allowing you to walk. This is the reason to find how difficult it is to walk on slippery ice, where there is little friction. (ii) It would not be possible to light a matchstick without friction between its head and the side of the matchbox. (iii) Cars and buses are able to run on roads because of friction between the tyres and the road.

HOTS

1. Since pressure equals force divided by the area of contact, it works out that the increase in friction generating area is exactly offset by the reduction in pressure; the resulting frictional forces then are dependent only on the frictional coefficient of the materials and the force holding them together. **2.** With other factors remaining the same the friction will be less when the area of contact is less. In rolling friction the area of contact between two mating surface is much less than the sliding fiction. Therefore, rolling friction is less than sliding friction. **3.** When a small

meteor enters the Earth's atmosphere, it goes from travelling through a vacuum to travelling through air. A meteor moving through the vacuum of space typically travels at speeds reaching tens of thousands of miles per hour. When the meteor hits the atmosphere, the air in front of it compresses incredibly quickly. When a gas is compressed, its temperature rises. This causes the meteor to heat up so much that it glows. The air burns the meteor until there is nothing left.

13. Sound

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

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

C. **1.** vibration **2.** decibel **3.** vacuum **4.** pitch **5.** time period

D. **1.** Larynx **2.** Sound wave **3.** Ultrasonic sound **4.** Amplitude **5.** Hertz

E. **1.** When a particle (or body) moves to and fro about its mean position, it is said to vibrate. This to and fro motion is called oscillation. Time taken to complete one oscillation is called its time period. Time period is denoted by T. **2.** Sound is a form of energy that travels in the form of vibrations through the air or any another medium. When these vibrations reach a person's or animal's ears, they can hear a sound. **3.** The frequency of stringed instruments can be changed by altering the length of the strings. **4.** (i) Prolonged exposure to high noise level can lead to loss of hearing. (ii) Fatigue due to lack of sleep (iii) High blood pressure (iv) Anxiety **5.** The sound of frequencies greater than 20,000 Hz is called ultrasonic sound. The sound of frequencies lower than 20 Hz is called subsonic or infrasonic sound.

F. **1.** The disturbance produced in the environment by undesirable, loud and harsh sound from various sources is called noise pollution. Increasing dependence of man on various kinds of machines at home or workplace or factories, etc. has contributed a lot to noise pollution. **2.** Scientifically, a musical sound is produced by regular vibrations while noise is produced by irregular vibrations. (For diagram *(musical note and noise)* refer to page 165 of our textbook.) **3.** (i) Use of amplifiers in public places should be banned. (ii) Vehicles should be fitted with more effective silencers. (iii) Machines should be designed in such a way that they produce minimum noise. (iv) Factories should be relocated far away from the residential areas. (v) Using soft/carpeted floors, curtains and sound absorbers such as cork, thermocole can reduce the noise level. **4. Wind or reed instruments (Sushir Vadya) :** Wind instruments make use of vibrating air columns. In these instruments, the air is blown in, either directly or through the reeds. Flute, shehnai, bagpipes, bugles, etc. are some of the examples of wind instruments. **Stringed instruments (Tantu Vadya) :** Stringed instruments

have taut strings which vibrate when they are plucked, struck or played with a bow. The pitch of stringed instruments can be changed by altering the length of the strings. Sitar, veena, harp, santoor and violin are some of the stringed instruments. **Percussion instruments (Avanaddha Vadya) :** They are instruments in which vibrations of a stretched animal hide produce sound. The frequency of vibration can be increased by stretching the hide more. Tabla, drums and mridangam are some examples of percussion instruments. **5.** (i) We use sound mainly to communicate with each other. (ii) Sound is used to determine the position of a sub marine or the depth of the sea at any place. (iii) Infrasonic are used in drilling deep oil wells.

G.

Sound	dB	Loudness
Rocket at take off	200	Dangerously loud
Aircraft engine	100-200	Painfully loud
Heavy traffic	90	Very loud
Loud music	90	Very loud
Ordinary conversation	40-60	Moderate
Whisper	20	Faint

HOTS

1. Withe the help of sound, that they are making because each and every persons length of vocal cord differs. **2.** Plants have the power of absorbing sound and not letting it escape and also by reflecting the sound among the trees it lessens the speed of the sound so the impact is generally low.

14. Chemical Effects of Electric Current

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

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

C. **1.** common salt **2.** chemical **3.** ions **4.** Electrolysis **5.** good

D. **1.** Conductor **2.** Cathode **3.** Electrolysis **4.** Electroplating **5.** Refining

E. **1.** Electroplating and electrorefining. **2.** Pure water cannot conduct electricity, because it does not contains impurities. Addition of salt, acid of alkalis, makes the distilled water a conductor of electricity. **3.** When electric current passes through a conducting solution, it decomposes the solution. The process by which an electrolyte is decomposed with the help of electricity is called electrolysis. For example, when electricity is passed through acidified water, it decomposes into hydrogen and oxygen gases. **4.** An LED is an electronic device. It starts emitting light even when a very weak current flows through it. It has two leads. The longer lead is the positive (+) and the smaller one is negative (-) end. LEDs are available in

different colours. **5.** Good conductor : Tap water, Bad conductor : Distilled water.

F. **1. Electroplating is done for the following purposes : (i) For decoration purposes :** Silver or gold plating of brasswares such as flower vase makes them decorative. **(ii) For preventing corrosion :** Iron objects can be protected by electroplating it with nickel. Brass objects, such as, bathroom fittings, etc. are electroplated with chromium. **(iii) Repairing finer machine parts :** Finer (small and precisely made) parts of certain machines cannot be repaired by ordinary methods involving welding, etc. Such parts are repaired by depositing the desired metal at the proper location electrolytically. **2.** For diagram *(electroplating)* refer to page 176 of our text book. **3.** When electric current passes through a conducting solution, it decomposes the solution. The process by which an electrolyte is decomposed with the help of electricity is called electrolysis. For example, when electricity is passed through acidified water, it decomposes into hydrogen and oxygen gases. **4.** Half fill the beaker with distilled water. Connect the bare ends of the copper wires A, B and C through a bulb with the help of cellotape. Touch the bare ends of the wires B and C with one another. Dip the bare ends of the wires B and A in the distilled water. You will observe that the bulb does not glow. The activity clearly proves that distilled water does not conduct electricity. **5. (i) Cathode :** The electrode connected to the negative terminal of a cell/battery is called cathode. **(ii) Anode :** The electrode connected to the positive terminal of a cell/battery is called anode. **(iii) Electrodes :** A metallic wire or rod (or plate), through which electric current either enters or leaves an electrolytic solution, is called an electrode. **(iv) Cation :** The positively charged ion is called a cation. **(v) Anion :** The negatively charged ion is called an anion.

HOTS

1. Plating requires ions to flow through an electrolyte in an electric field. Positive ions flow with the electric field, negative ions against the electric field. This electric field comes from a DC supply connected to the electrodes. With AC, there will be no net ion flow and no plating will happen because the electric field direction will keep alternating and ions will oscillate back and forth within the electrolyte. **2.** No, as Mercury is a pure liquid metal. It conducts the electricity but it is not an electrolyte because an electrolyte is defined as a compound that ionizes when dissolved in suitable ionizing solvents such as water where mercury is a metal element not a compound.

15. Natural Phenomena

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

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

C. **1.** Volcanic **2.** electrons **3.** Atmospheric **4.** Lightning **5.** Crust

D. **1.** Earthing **2.** Lightning **3.** Earthquake **4.** Richter scale **5.** Tectonic

E. **1.** The point from where the shock-waves of an earthquake originate is termed as seismic focus. Focal depth may range from about 60 km to 300 km. **2.** There are two kinds of charges—positive and negative. **3.** The seismograph is used to detect and then record the intensity of seismic waves generated by an earthquake. **4.** A lightning conductor consists of long, thick metal rod/strip which has sharp spikes at its upper end. The spikes pointing towards the sky are fixed at the highest point of the building. **5.** An electroscope is a device used to detect the presence of an electric charge, and to find the nature and quantity of charge.

F. **1.** When two bodies are rubbed together, the free electrons are transferred from one body to the other. On rubbing, the body which gains free electrons becomes negatively charged and the body which loses free electrons becomes positively charged. An electroscope is a device used to detect the presence of an electric charge, and to find the nature and quantity of charge. **2. Seismic Focus :** The point from where the shock-waves of an earthquake originate due to sudden movement/slip of rocks is termed as seismic focus. The seismic focus is also called seismic origin or hypocentre. **Epicenter :** The epicenter is the place on the surface of the Earth, directly above the focus. The intensity of the earthquake is the greatest at the epicentre. **Focal depth :** The depth below the earth's surface of the focus of an earthquake is called focal depth. **Seismic Waves :** The waves generated in the lithosphere due to the sudden shifting of crustal rocks are called shock waves or seismic waves. **3.** The huge masses of clouds get electrically charged due to rubbing of the clouds with the air and due to the presence of dust, carbon and other charged particles in the air. When two clouds with unlike charges come very close to each other, the charge flows with high speed from one cloud to the other through air between them. A huge spark between the clouds is, thus, produced. This spark is called lightning. Lightning can kill men and animals. It can also cause fire and shatter buildings. Lightning can severely burn and cause death of living beings if they happen to be in that area. A lightning conductor consists of long, thick metal rod/strip which has sharp spikes at its upper end. The spikes pointing towards the sky are fixed at the highest point of the building. The lower end of it is joined to the metal plate that is buried deep in the ground. If lightning strikes, it hits the conductor rather the building and the electric charge passes down the metal strip into the ground through the plate. **4.** (i) Take shelter under a big table and stay there, till the tremors stop. (ii) Stay away from the heavy objects hung on

the walls as they may fell on you. (iii) In case you are in the ground, be away from buildings, trees etc. sit on the ground. **5.** Tsunami is a Japanese word meaning harbour wave. A tsunami is a series of huge waves that occur after under the sea disturbances such as earthquakes or volcanic eruptions. The waves travel in all directions from the area of disturbance. These waves can be as high as 50 feet or more. They may attain speeds of over 750 km/h. The tsunami that hit the coasts of India and some other countries on the Indian Ocean on December 26, 2004 killed nearly 3,00,000 people and made thousands of people homeless.

HOTS

1. Lightning is a very heavy flow of charge between clouds or between clouds and Earth. In hilly areas, clouds are comparatively closer to the ground than in the plains. Therefore, lightning strikes are more frequent in hilly areas. **2.** Most umbrellas have a metal rod as the staff which supports the covering. It protrudes through the covering at the top. One holds the other end. Walking around with one during a thunderstorm is as dangerous as carrying a mini lightning rod, because lightning could be attracted by it.

16. Light

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

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

C. **1.** seven, dispersion of light **2.** Eye **3.** reflection **4.** reflection **5.** Virtual

D. **1.** Reflection of light **2.** Hypermetropia **3.** Myopia **4.** Real **5.** Normal

E. **1.** The phenomenon due to which a ray of light travelling from one optical medium to another bounces off from its surface with the change of angle, is called reflection of light. **2.** There are two laws of reflection : **Law 1 :** The angle of incidence is equal to the angle of reflection i.e. i = r. **Law 2 :** The incident ray, the reflected ray and the normal at the point of incidence all lie in the same plane. **3. Real Image :** (i) It can be taken on the screen. (ii) It is always inverted. (iii) The rays of light after reflection or refraction meet at a point. **Virtual Image :** (i) It cannot be taken on the screen. (ii) It is always erect but laterally inverted. (ii) The rays of light after reflection or refraction appear to meet at a point. **4.** (i) Cornea (ii) Iris and Pupil (iii) Retina (iv) Eye lens (v) Blind spot (vi) Ciliary muscles. **5.** When a ray of light falls on a smooth reflecting surface e.g. a mirror, it gets reflected along a particular direction. That is why, a smooth surface gives a sharp and clear image. Reflection of light from a smooth mirror is called a regular reflection. When light rays fall on an irregular or rough reflecting surface, they get reflected in different directions. As a result the image is

not sharp and clear. This type of reflection is called irregular or diffused reflection.

F. **1.** To verify the laws of reflection. Follow the steps : (i) Take a wooden board and on it fix a white sheet of paper with cello tape. (ii) In the middle of the paper draw a straight line AB with a pencil. Along the line AB, place the long face of plane mirror strip and hold it in the position with the plasticine. (iii) Fix two common pins P and Q in the front of the mirror strip in an upright position. The distance between the pins should be 4 cm to 5 cm. (iv) Looking from side B of the plane mirror as illustrated in figure. Fix two more common pins R and S, such that these pins and images of pins P and Q are in same straight line. Now remove the mirror strip. Remove the pin P, Q R and S one by one and draw small circles around the pin points. Join PQ and RS and produce them to meet the mirror line AB at O. O is the point of incidence. At O draw ON perpendicular to the mirror surface. Measure i i.e. PON and r i.e. SON. You will find that angle of incidence (PON) is equal to the angle of reflection (SON). Hence first law of reflection is verified. Further more, as incident ray OP, reflected OS and the normal ON, lie in the plane of the paper, we can say that the incident ray, the reflected ray and the normal all lie in the same plane. Hence second law of reflection is verified. **2.** Let us consider a point object O placed in front of a plane mirror (MM'). Consider two rays of light OA and OB falling on the mirror at points A and B, respectively. These rays after suffering reflection, get reflected along AC and BD, respectively. The reflected rays appear to come from point I. The point I is the image of the point object O. *For diagram refer page no. 198.* **3. (i) Cornea :** It is a transparent spherical membrane in front of the eye. Light enters the eye through the cornea. **(ii) Iris and Pupil :** Iris is a dark-coloured muscular diaphragm which has a small circular opening in its middle. The central circular aperture of iris is called pupil. The pupil appears black because no light is reflected from it. **(iii) Retina :** The inside surface of the rear part of eyeball where the light entering the eye is focused is called retina. It acts as a screen for image formation in the eye. The surface of retina consists of about 125 million light sensitive receptors. These receptors are of two types - rods and cones. When light falls on these receptors, they send electrical signals to the brain through optic nerve. **(iv) Eye lens :** Behind the pupil and the iris is the eye lens. It is a transparent, crystalline structure made up of many concentric layers. It is kept in its position by a strong elastic form called the suspensory ligaments. The eye lens helps to divide the eye into two chambers. **(v) Blind spot :** There are no rods and cones at the point where optic nerves leave the eye- ball to go the brain. So, if an image is formed in this part of the retina, then no signal is sent to the brain. As a result, the object is not seen. The part of retina is therefore called the blind

spot of the eye. **(vi) Ciliary muscles :** These muscles hold the eye lens in position and control the focal length of the eye lens. By contracting and expanding they increase and decrease the focal length of the eye lens. **4. (i) Short-sightedeness or Myopia :** A person suffering from this defect of vision can see nearby objects clearly but cannot see distant objects clearly. In a myopic eye, the image of the distant object is formed in front of the retina and not on the retina. This defect of vision can be corrected by using concave lens of appropriate focal length. **(ii) Long-sightedness or Hypermetropia :** A person suffering from this defect of vision can see distant objects clearly but cannot see nearby objects clearly. In a hypermetropic eye, the image of nearby object is formed behind the retina and not on the retina. This defect of vision can be corrected by using convex lens of appropriate focal length. **5.** To enable blind people to study, Louis Braille, himself a blind person, created a script in 1834, of raised dots representing letters of the alphabet, numbers, and punctuation marks. This system later came to be known as the Braille system. This system of letters, numbers and punctuation marks consists of six raised points or dots used in 63 possible combinations. Every character in the braille code is based on an arrangement of one to six raised dots, with each dot having numbered position in the braille cell. The table above indicates the dots are arranged in the braille cell for each letter of the alphabet. Braille numbers are formed using the first ten letters of the alphabet 'a' to 'j' and a special number sign comprising of dots 3, 4, 5 and 6.

G. Do it yourself.

HOTS

1. It reflects back with the same path and the angle of incident and angle of reflection become zero. **2.** Because the mirrors absorb little light.

17. Stars and the Solar System

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

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

C. **1.** Ursa Major **2.** star, satellite **3.** helium **4.** 9.46×10^{12} **5.** Venus

D. **1.** Pole star **2.** Meteors **3.** Constellation **4.** Solar system **5.** Artificial satellite.

E. **1.** It means that it takes 4.3 years for light to reach us from that star. **2.** A light year is the distance travelled by light in one year. We know that speed of light is 3,00,000 km/s and 1 year = $1 \times 365 \times 24 \times 60 \times 60$ seconds. 1 light year = $3,00,000 \times 365 \times 24 \times 60 \times 60$ km = 9.46×10^{12} km. = 9.46×10^{15} m **3.** The Moon is a natural satellite of the Earth. The Moon reduces the darkness on many nights of the year. Sometimes it shines

bright enough to cast shadows and sometimes it becomes invisible. In fact, it is our nearest neighbour in space and is 3,84,000 km away. This is also the reason why it shines brighter than the other stars and planets. **4.** It appear to be biggest or brightest because it is the nearest star from us. **5.** The solar system consists of the Sun at the centre, the eight planets, asteroids, comets and meteors revolving around the Sun.

F. **1.** The solar system consists of the Sun at the centre, the eight planets, asteroids, comets and meteors revolving around the Sun. **Sun :** The Sun is the closest star to the Earth. The average distance of the Sun from the Earth is 150 million kilometres. We get heat and light from the Sun. Its surface temperature is about 6000°C. **Planets :** The heavenly bodies which revolve around the Sun are called planets. At present there are eight planets and five dwarf planets in our solar system. The eight planets revolve around the Sun. These are Mercury, Venus, Earth, Mars, Jupiter, Saturn, Uranus and Neptune. **Asteroids :** Asteroids are the rock pieces that revolve around the Sun between the orbits of Mars and Jupiter. There are nearly one lakh asteroids. The largest asteroid called Ceres has a radius of 350 km, while the smallest is about 6 m across in size. **Comets :** Comets are beautiful bodies in the solar system, with a distinct head and a luminous tail moving across the sky. These are the heavenly bodies which revolve around the Sun in an elliptical path. They take a very long time to complete one revolution around the Sun. **Meteors and Meteorites :** Meteors are the heavenly bodies consisting of small pieces of stones and metallic rocks. Meteors travel at high speeds. The part of a meteor, which does not burn on its entry into the Earth's atmosphere and lands on the Earth is called meteorite. **2. Planets :** Planets are those heavenly bodies which do not emit light. Plants orbit stars. **Stars :** Stars are those which emit light of their own and can be seen clearly on nights. Stars burn and give off light. **Satellites :** Satellites are those which revolve around the planets. Satellites orbit planets. **3.** Artificial satellites are used for : (i) Weather forecasting (ii) Satellite communication : Cellular phones and long distance telephones, fax, etc. are a few of the services provided by satellite communication. (iii) Television and radio transmission (iv) For locating mineral resources, underground water and for land mapping (v) Collecting information about other planets and about the outer space. **4.** Stars are huge heavenly bodies which are extremely hot. Due to high temperature they start shining and emit their own light. The light emitted by the stars makes them visible or shine. We can see about 3000 stars with our naked eyes on a clean night. **5. Ursa Major :** It is also known as the Big Dipper, the Great Bear and Saptarishi. It forms the shape of a spoon-like object known as a dipper, which was used in olden days to drink water. There are three stars in the handle of the dipper and four in the bowl. The position of the Pole Star

(Dhruva Tara) can be located with the help of Ursa Major. Ursa major is also called Great Bear (or Saptarishi) because, the seven bright stars of Ursa Major along with several other fainter stars form a pattern resembling a bear. **Ursa Minor or Little Bear or Laghu Saptarishi :** The Ursa Minor constellation is also a group of seven stars, similar to the Ursa Major constellation. However, the stars in the Ursa Minor are closer and smaller as compared to the stars in Ursa Major. The form is as an outline of small bear or ladle or a kite with a long tail or a question mark. At the tail of Ursa Minor, is a star of average brightness. It is called Pole star or Polaris. **Orion or Hunter or Mriga or Vyadha :** Orion is another constellation of seven stars and is one of the most magnificent constellations seen in the winter sky. Its name in Indian astronomy is Vyadha or Mriga. Orion is also known as Kalpurush. **Scorpius or Vrischika :** Scorpius is one of the brightest constellations. The satrs form the image of a scorpion, with a long curving tail. From the northern hemisphere, Scorpius can be seen in the southern sky, close the horizon. Its tail curves to the south. The brightest star Antares marks the heart of the scorpion.

G.

Planet	Distance from the Sun In million km.	Relative to that of the Earth from the Sun	Time for one revolution around the Sun	Period of rotation about their axis (Earth days)	No. of moons	Mean Equatorial radius of planet in kilometres
Mercury	57.9	0.387	88 day	58.6 day		2, 439.7
Venus	108.2	0.72	225 day	243.0 day		6, 051.8
Earth	149.6	1.0	365.25 day	0.997 day	1	6, 371.0
Mars	227.9	5.19	11.86 year	1.026 day	2	3, 389.5
Jupiter	778.3	5.19	11.86 year	0.413 day	67#	69, 911
Saturn	1426.7	9.81	29.46 year	0.444 day	62	58, 232
Uranus	2870.6	19.13	84 year	0.718 day	27	25, 362
Neptune	4498.4	30.03	165 year	0.671 day	14	24, 662

HOTS

1. Because it does not have any equipments and also its time period differs from that of the Earth. **2.** No, because there is no atmosphere (oxygen). For combustion; oxygen supply is essential which is not present on moon.

18. Air and Water Pollution

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

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

C. **1.** ozone **2.** alternative energy **3.** tarnishless **4.** filtration **5.** Chlorine, ozone gas

D. **1.** Particulate pollutants **2.** Carbon dioxide **3.** Eutrophication **4.** LPG **5.** Mercury, nickel

E. **1.** The contamination of environment with harmful (toxic and poisonous) substances due to certain natural phenomena and human activities is called environmental pollution or simply pollution. Any substance that causes pollution is called a pollutant. **2.** (i) We should use alternative sources of energy like solar energy, hydropower, wind energy and nuclear energy instead of conventional sources of energy such as coal and petrol. (ii) We should make use of unleaded petrol in vehicles. Above all, use public transport. Travel in buses, or trains and walk short distances. If you must take cars, try carpool. (iii) Adopting EURO standards and sticking to pollution emission norms from automobile exhausts are other measures. (iv) We should make use of CNG. **3.** Potable or drinking water is colourless, odourless and tasteless and contains sufficient amount of dissolved oxygen. It is also free from germs and harmful chemicals. (i) Discharge of toxic industrial wastes into rivers and lakes. (ii) Excessive use of fertilizers and pesticides in agriculture. (iii) Contamination of water bodies with toxic metals such as, lead, arsenic, cadmium, mercury, nickel, etc. (iv) The presence of pollutants such as acids, alkalies, dyes, etc. make the water coloured, foul-smelling and bad in taste. **5.** Typhoid, cholera.

F. **1.** Air pollution is the contamination of air by undesirable particles and gases known as air pollutants. Some common air pollutants are dust and soot particles, chemical fumes, CFCs (chlorofluorocarbons), and gases such as carbon monoxide, sulphur dioxide and oxides of nitrogen. The unwanted and harmful substances which pollute water are called water pollutants. Examples : Sewage, industrial waste, synthetic detergents, chemical fertilizers, oils, heavy metals, radioactive waste, etc. **2.** The increase level of carbon dioxide gas in the air traps the heat radiated from the Sun and does not allow it to escape into the atmosphere. This results in the increase in the Earth's temperature. This process of trapping of radiated heat due to increased concentration of carbon dioxide in the air is called greenhouse effect. It leads to increase in heating of Earth and this phenomenon of rise in temperature of earth surface is called global warming. **3.** Carbon monoxide is a poisonous gas. This combines with the haemoglobin of our blood and forms a stable compound called carboxy-haemoglobin. Due to the formation of this compound, haemoglobin is unable to carry oxygen to various parts of our body. This leads to respiratory problems. It causes suffocation and may even cause death. This is called carbon monoxide poisoning. **4.** (i) Do not throw the garbage into rivers and lakes. The rivers and lakes should be cleaned from time to time. (ii) The city sewage should be treated at the sewage treatment plant to remove pollutants before discharging into water bodies. (iii) Toxic industrial waste should be treated chemically to remove harmful substances

present in it. (iv) We should not wash clothes, clean utensils and take bath near the source of water. **5.** (i) Polluted air is unpleasant to breathe. (ii) Ozone causes irritation to the nose and throat. Traces of ozone in the air do not harm, but at higher concentration (above 0.1 ppm) ozone is toxic and harmful to human beings. Ozone also attacks rubber products. (iii) Carbon monoxide is a poisonous gas. This combines with the haemoglobin of our blood and forms a stable compound called carboxy-haemoglobin. Due to the formation of this compound, haemoglobin is unable to carry oxygen to various parts of our body. This leads to respiratory problems.

HOTS

1. Untreated surface water in rivers is not safe to drink unless it is treated to remove bacteria, viruses and parasites. Drinking water contaminated by these organisms can cause several diseases. **2.** CNG is a clean burning fuel. It is actually the cleanest of all fossil fuels.