Sample Paper-9

Answers

1. Phloem transports soluble products of photosynthesis in a plant.

2. This is because black surfaces absorb more heat as compared to other surfaces.

3. The gas evolved with effervescence and extinguishes the burning candle is CO_2. If one of the compounds formed is $CaCl_2$, the reaction would be

$$CaCO_3(s) + 2HCl(aq) \rightarrow CaCl_2(aq) + H_2O(l) + CO_2(g)$$

4. (i) Focal length, $f = \frac{1}{p} = \frac{1}{-2} = 0.5 \text{ m} = -50 \text{ cm}$.

(ii) The lens used is concave lens.

5. (a) Nastic (b) Tropic
(c) Tropic (d) Nastic

6. (a) The gas is sulphur dioxide (SO_2). It will not react with dry litmus paper.
(b) The gas will bleach moist litmus paper. The moist blue litmus paper changes into red, as the gas is dissolved in moisture to give sulphurous acid.
The balanced chemical equation involving the formation of gas is :

$$S(s) + O_2(g) \xrightarrow{\text{Heat}} SO_2(g)$$
$$SO_2(g) + H_2O(l) \longrightarrow H_2SO_3(aq)$$

7. (a) Carbon dioxide gas will evolve and sodium carbonate will be formed.

$$2NaHCO_3 \xrightarrow{\Delta} Na_2CO_3 + CO_2 + H_2O$$

(b) $CaSO_4 . \frac{1}{2} H_2O + 3/2\ H_2O \longrightarrow CaSO_4 . 2H_2O$.
Plaster of Paris Gypsum

(c) The common name of the compound $CaOCl_2$ is bleaching powder.

Or

(a) Combination reaction
(b) Double displacement reaction (precipitation reaction)
(c) Decomposition reaction. (Thermal decomposition)

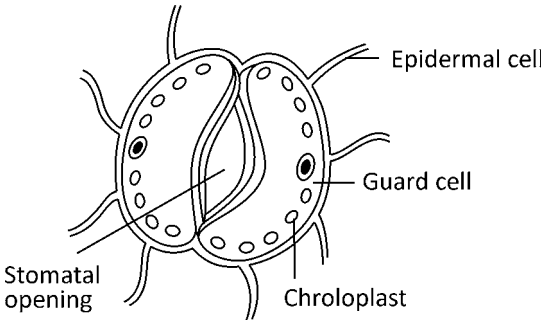
8. (i) Sodium (Na) and Potassium (K)
(ii) Magnesium (Mg) and Calcium (Ca)
(iii) Helium (He) and Neon (Ne)

9. (a) *Salivary glands*—They are three in pairs as parotid, sub-maxillary and sub-lingual.
They secrete saliva which contains and enzyme salivary amylase, which convert starch into maltose.

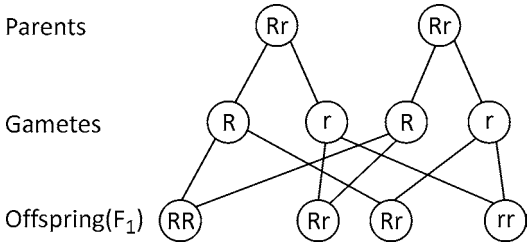
(b) *Liver*—It is the largest digestive gland of the human body which secretes bile. The bile helps in emulsification of fats.

(c) *Pancreas*—It is the second largest gland which secretes pancreatic juice which contains three types of photolytic enzymes-tyrpsin, stepsin and amylopsin.

Or



10. (a)



(b) 25% or one-fourth

(c) One-fourth of the flies, *i.e.* 24 have white eyes. Therefore, 96–24 = 72 of the offspring are likely to have red eyes.

11. (i) Burning plastic is not an eco-friendly method of waste disposal because it causes air pollution. If the wastes are disposed as per the method suggested by Rakesh, different treatments can be given to the seggregated wastes separately. The organic waste can be used for compost formation and the waste like plastic, glass, tin, etc. can be sent for recycling.

(ii) We should not throw packets, cans etc. on the road or parks. The waste material should be thrown in dustbins. If separate dustbins are available for biodegradable and non-biodegradable waste, we should dispose off waste accordingly.

12. (a) Atmospheric refraction makes the sun appear higher than its actual position.

(b) Atmospheric refraction makes the sun visible even when the sun is just below the horizon.

(c) The twinkling of star is due to atmospheric refraction of starlight.

13. (a) The unit used in selling electrical energy to consumers is kiloWatt hour.

(b) When two lamps are connected in parallel, total power, $P = P_1 + P_2 = 100 + 40 = 140$ W

Potential applied, V = 220 volts [Given]

$\therefore$ The electric current drawn from the supply,

$$I = \frac{P}{V} = \frac{140}{220} = \frac{7}{11} A$$

14. (a) The pointer of the galvanometer deflects towards right.

(b) The deflection becomes zero.

(c) The deflection again occurs in the opposite direction, *i.e.* towards left.

Or

(i) North pole to south pole.
(ii) Strong magnetic field in that particular crowded region
(iii) Ac can be stepped up and transmitted over long distances without much loss of energy.

15. (i) Exploitation of resources with short-term aims mean using resources rapidly and within no time limit.
Advantages of exploiting resources with short-term aims:
1. It provides the immediate advantage of meeting current basic human needs.
2. Fast industrialization and development.
3. Provides large number of products for use and comforts.
4. Improvement of the lifestyles of people increase the pollution levels, global warming, depletion of resources etc.

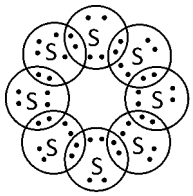
(ii) To become more eco-friendly, I will suggest :
(a) All the bulbs and tube-lights should be replaced with LED (light emitting diode).
(b) At home, everyone should use natural ventilation and light in day time.
(c) We should use cloth bags instead of plastic bags for shopping.
(d) We should avoid wastage of water, for example, waste water can be collected and use for mopping the floor. It can also be used for gardening purposes, etc.

16. (a) Aluminium is more reactive than carbon, hence carbon cannot be used to reduce the aluminium oxide.
(b) Potassium is a highly reactive metal, which, when exposed to air, burn violently.
(c) Metals have free electron those are are responsible to conduct electricity.
(d) Tungsten is a filament which has a very high melting point, hence it is used in bulbs.
(e) The shining surface of metals is tarnished after sometime because the metals react with the moisture in the air and forms a layer over it, which cover its original appearance.

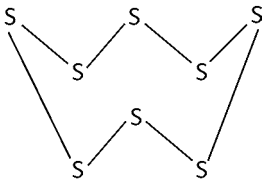
Or

(a) Platinum, Gold, and Silver are used to make jewellery because they are very lustrous. Also, they are very less reactive and do not corrode easily.
(b) Sodium, Potassium, and Lithium are very reactive metals and react very vigorously with air as well as water.Therefore, they are kept immersed in kerosene oil in order to prevent their contact with air and moisture.
(c) Though aluminium is a highly reactive metal, it is resistant to corrosion. This is because aluminium reacts with oxygen present in air to form a thin layer of aluminium oxide. This oxide layer is very stable and prevents further reaction of aluminium with oxygen. Also, it is light in weight and a good conductor of heat. Hence, it is used to make cooking utensils.
(d) Carbonate and sulphide ores are usually converted into oxides during the process of extraction because metals can be easily extracted from their oxides rather than from their carbonates and sulphides.
(e) Metals which have low reactivity such as Silver, Gold does not corrode easily.

17. (a) The atomic number (Z) of sulphur is sixteen and its electronic configuration is 2, 8, 6. The sulphur atom has six valence electrons. The chemical formula of sulphur molecule is S_8. Each sulphur atom is linked to similar atoms on either sides by single covalent bonds and thus, completes its octet. The molecule is in the form of a ring also represented by a crown shape.

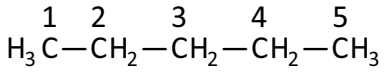


Ring structur of S_8 molecule

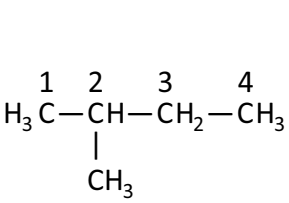


Crown shape of S_8 molecule

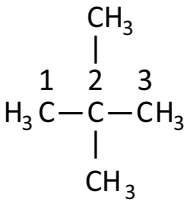
(b) Pentane (C_5H_{12}) has a skeleton of five carbon atoms. It can exist as a straight chain as well as two branched chains. There are three structural isomers for the hydrocarbon which is an alkane.



Pentane



2-Methyl butane
(Iso-butane)



2,2-Dimethyl propane
(Neo-pentane)

18. (a) It means that 1 joule work is done in moving 1 coulomb of positive charge from one point to the other in an electric field.

(b) This is because of the high resistivity and high melting point of the alloy. Also, they do not oxidise when red hot.

(c) (i) The highest resistance can be secured by connecting all the four coils in series.

$\therefore$ Equivalent resistance of series combination, $R_S = 4 + 8 + 12 + 24 = 48\ \Omega$

Hence, the highest resistance that can be secured by given coils is 48 Ω.

(ii) The lowest resistance can be secured by connecting all the four coils in parallel.

$\therefore$ Equivalent resistance of parallel combination,

$$\frac{1}{R_p} = \frac{1}{4} + \frac{1}{8} + \frac{1}{12} + \frac{1}{24} = \frac{1}{2}$$

Or $R_p = 2\ \Omega$

Hence, the lowest resistance that can be secured by given coils is 2 Ω.

19. (a) (i) Virtual (ii) Erect

(iii) diminished (iv) Object distance is more than image distance.

(b) Focal length, f = 18 cm, Image distance, v = 24 cm, object distance, u = ?

using lens formula, we have

$$\frac{1}{f} = \frac{1}{v} - \frac{1}{u}$$

$$\frac{1}{u} = \frac{1}{v} - \frac{1}{f}$$

$$\frac{1}{u} = \frac{1}{24} - \frac{1}{18}$$

$$\frac{1}{u} = \frac{3-4}{72}$$

$$\frac{1}{u} = \frac{-1}{72} \text{ Or } u = -72 \text{ cm}$$

$$\text{Magnification, } m = \frac{v}{u}$$

$$\Rightarrow \qquad m = \frac{24}{(-72)} = -0.3.$$

Negative sign shows that image formed is negative.

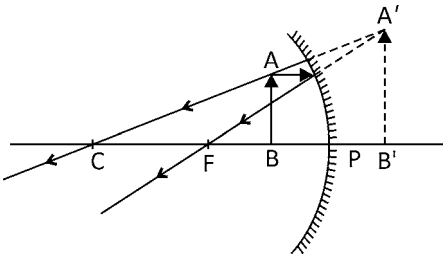
So, magnification = 0.3

Image formed by convex mirror is always virtual, erect and smaller is size.

Or

(i) (a) Concave mirror, as it can give an inverted and enlarged image which meet at infinity.
(b) Convex mirror, as it can give an erect and diminished image within the focal length.
(c) Concave mirror, as it can converge all the parallel beam of light rays at one point.

(ii) The range of distance of the object from the mirror should be between focus and pole.
Image is virtual, erect and larger than the object. The ray diagram showing the image formation is given below :



20. (a) The outside raw materials used by an organism are :
(i) food for obtaining energy.
(ii) oxygen to use it in the process of breakdown of food sources for cellular needs.

(b) Plants get carbon dioxide from atmosphere. It gets water and minerals from the soil.

(c) The components along with functions of transport system in human beings are as :
Heart—It is a muscular pumping organ that helps to pumb blood around the body.
Blood—The blood is a fluid connective tissue. It consists of watery fluid called *plasma,* and three types of cells : *red blood cells, white blood cells* and *platelets.* Plasma helps in transporting food, carbon dioxide, salts and nitrogenous wastes in dissolved form.
Red blood cells carry oxygen, white blood cells produce antibodies, which provide immunity against various pathogens. Platelets help to clot the blood at the site of injury.
Blood vessels—There are three types of blood vessels. They are : *arteries, veins* and *capillaries.* These vessels help in transporting the blood in the body.
Lymph—It carries digested and absorbed fats from intestine and transports them to the blood. It also drains excess fluid from extracellular space back into the blood.

21. (a) Vegetative propagation is the only method of reproduction of such plants which do not form viable seeds. It allows the plant to grow quickily. It takes less time to produce fruits or other beneficial plant produce.

(b) There are several advantages if the organism is reproduced by spores :
(i) There are large numbers of spores formed from one sporangium.
(ii) The spores can remain in dormant state till the favourable conditions are available.

(iii) The spores have thick covering called cyst which helps them to survive in unfavourable conditions.
(iv) The spores are very light and can spread easily through water, air or through the animals.

22. Angle of incidence = 90° – 30° = 60°
The angle of refraction in the glass will be less than 60°.

Or

The image will be formed behind the mirror at the same distance of 5 cm.

23. (a) Binary fission.
(b) Cotyledons.

24. When we boil a leaf in alcohol, its chlorophyll dissolves in alcohol, leaving the leaf colourless. Now when we test for starch by adding Iodine the colour change is clear.
The peel should be placed always on a clean and dry slide. We should always use a brush for transferring the peel on the slide.

25. The resistors P and Q are connected in series. Equivalent resistance, $R = R_p + R_q = 4 + 2 = 6\Omega$
Potential difference, V at P and Q = IR = 0.5 × 6 = 3 V

26. Pure and concentrated acetic acid solidifies at 16.6°C. The common name given to frozen acetic acid is glacial acetic acid. Glacial acetic acid is transparent like glass and crystalline in structure.

27. In case of (a) no metal is deposited. It is because a metal does not react chemically with its own salt solution.
In case of (b) metal is deposited. It is because zinc being higher in the metal reactivity series, displaces copper from the copper sulphate solution.

Sample Paper-10

Answers

1. Green plants are called producers because they can synthesise food for all living beings by the process of photosynthesis.

2. Saliva contains water, salts, mucin and an enzyme salivary amylase that breaks down starch present in the food into sugar.

3. Copper metal slowly reacts with water, carbon dioxide and oxygen present in air to form a layer of basic copper carbonate which is greenish in colour.

$$2Cu + \underset{\text{(Present in air)}}{H_2O + CO_2 + O_2} \longrightarrow \underset{\text{Basic copper carbonate (green)}}{Cu(OH)_2\ CuCO_3}$$

Now, lemon juice contains citric acid while tartaric acid is present in tamarind. Both these acids react with basic copper carbonate to form soluble salts such as copper acetate (with citric acid) and copper tartarate (with tartaric acid). The basic copper carbonate gets removed from the surface of the copper metal and the surface of the metal shines.

4. Different rays deviate differently in the prism because the angle of refraction for different colours having different wave lengths is different while passing through the glass prism.

5. Two functions of stomata are :

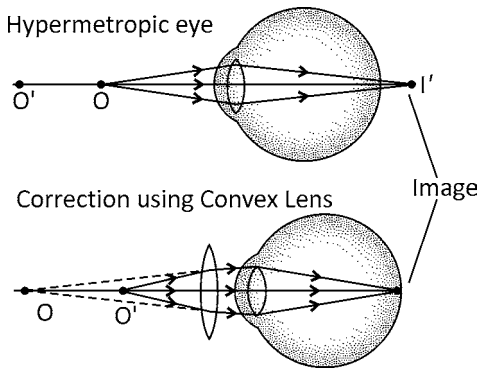
(i) Exchange of gases between the plant and the atmosphere takes place through stomata.

(ii) Transpiration in plants take place through stomata.

6. (a) No, the resistance of the bulbs connected in series will be three times the resistance of single bulb. Therefore, the current in the series combination will be one-third of the current in each bulb in parallel combination. So the parallel combination bulbs will glow more brightly.

(b) The bulbs in series combination will stop glowing as the circuit is broken and the current is zero. However, the bulbs in parallel combination will continue to glow with the same brightness.

7. The required diagram is shown below :



Given : Distance of near point of defective eye, $v = -1$ m $= -100$ cm

Distance of near point of normal eye, $u = -25$ cm

Applying the formula $\frac{1}{f} = \frac{1}{v} - \frac{1}{u}$

$$\frac{1}{f} = \frac{1}{-100} - \frac{1}{-25}$$

$$= \frac{-1}{100} + \frac{1}{25} = \frac{-1+4}{100} = \frac{3}{100}$$

Or $f = \frac{100}{3} = 33.33$ cm

$\therefore$ Power, $P = \frac{100}{f} = \frac{100}{33.3} = 3.0$ D

Hence, the power of the required lens is 3.0 D.

8. Two reason are as follows :

(i) Soft iron inside the coil makes the magnetic field stronger because it becomes a magnet itself when the current is flowing.

(ii) It loses its magnetism as soon as the current stops flowing.

Or

(a) Since the coil is kept in North-South plane and the current is flowing in anticlockwise direction through the loop as per the observer's position, the direction of magnetic field according to Maxwell's right hand thumb rule will be east to west direction.

(b) Since the coil is kept in East-west plane and the current is flowing in anticlockwise direction through the loop as per the observer's position, the direction of magnetic field according to Maxwell's right hand thumb rule will be south to north direction.

(c) When the current carrying coil is placed horizontally and the direction of current is found to be clockwise then the direction of the magnetic field for the observer below the coil is in the downward direction.

9. Neutralisation reaction is the reaction between an acid and a base to form salt and water. For example

$$\text{Acid + Base} \longrightarrow \text{Salt + Water}$$

(i) $HCl(aq) + NaOH(aq) \longrightarrow NaCl(aq) + H_2O(l)$

(ii) $HNO_3(aq) + KOH(aq) \longrightarrow KNO_3(aq) + H_2O(l)$

10. (a) Compounds containing carbon and hydrogen are called hydrocarbons.

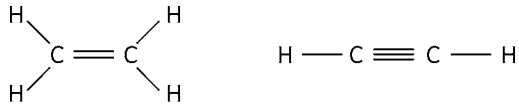
Examples—Methane, ethane, etc.

(b) Saturated hydrocarbons contain carbon-carbon single bonds.

Methane Ethane

Saturated hydrocarbons

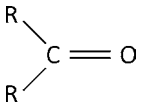
Unsaturated hydrocarbons contain at least one carbon-carbon double or triple bond.



Ethene Ethyne

Unsaturated hydrocarbons

(c) *Functional group*—An atom/group of atoms joined in a specific manner which is responsible for the characteristic chemical properties of the organic compounds. Examples are hydroxyl group (—OH), aldehyde goup (–CHO), carboxylic group (–COOH), ketonic group.



11. (i) Definitely yes, we should protect our forest for clean and green environment. Gift of trees to us are soil, water, oxygen etc.

(ii) Yes, local people are real stake holders of the forest and its produce.

(iii) Chipko movement has challenged the old belief that forests are only meant for timber.

12. (i) Bases which are soluble in water are known as alkalis. For example, Sodium hydroxide (NaOH).

(ii) Less is the pH of the mouth, more will be the tooth decay. It can be prevented by brushing our teeth with toothpaste after every meal because tooth taste is slightly basic in nature. It neutralise the acidity of mouth.

(iii) Bee stings consist of formic acid which causes pain and irritation.

Or

(a) Oxidation Reaction : It is a chemical reaction in which there is gain of oxygen or loss of hydrogen.

(i) $2Mg(s) + O_2(g) \xrightarrow{Heat} 2MgO(s)$

Here, Magnesium is oxidised to become Magnesium Oxide.

(ii) $2Cu(s) + O_2(g) \xrightarrow{Heat} 2CuO(s)$

Here, Copper is oxidised to become Copper Oxide.

(b) Reduction Reaction : It is a chemical reaction in which there is loss of oxygen or gain of hydrogen.

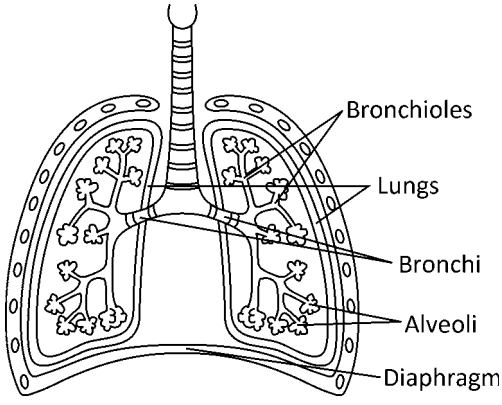
(i) $CuO + H_2 \xrightarrow{Heat} Cu + H_2O$

Here, Copper Oxide is reduced to become Copper.

(ii) $2MgO \xrightarrow{Heat} 2Mg + O_2$

Here Magnesium oxide reduce to magnesisum.

13. The lungs have special air sacs called 'alveoli'. The presence of air sac increases the surface area inside the lungs. Alveoli are the places where exchange of gases takes place. There are about 300-350 millions of alveoli in each lung. The alveoli are filld with air and they swell up. During inspiration, the ribs move up and diaphragm flatens which increases the surface area inside the lungs. The increased surface area helps in maximum exchange of gases to take place.



Or

The following raw materials are required for photosynthesis:

Carbon Dioxide: Plants get CO_2 from atmosphere through stomata.

Water: Plants absorb water from soil through roots and transport to leaves.

Sunlight: Sunlight, which is absorbed by the chlorophyll and other green parts of the plant.

14. The three ways are as follows :

(a) *Natural Selection*—A process in which better quality genes are selected by nature and allowed to multiply.

(b) *Genetic drift*—It is a change in gene frequency due to a chance and not by the natural selection.

(c) *Mutations*—These are the sudden changes in the gene inherited by offspring for at least 4 to 6 generations.

15. Impacts on our environment by the construction of big dams are as follows :

- Due to the construction of high-rise dams, a large number of human settlements are submerged in the water of large reservoir formed by the dam and many people are rendered homeless.
- The construction of high-rise dams in the rivers contributes to deforestation and loss of biodiversity. This is because, a vast variety of flora and fauna (plants and animals) get submerged in the water which disturb the ecological balance.
- The construction of dam on a river disturbs the ecological balance in the downstream area of the river which decreases the fertility of soil and the crop yields are decreased.

16. (a)

Electrical energy	*Electrical power*
1. It is defined as work done in the circuit.	It is defined as the rate at which work is done in the circuit.
2. Its SI unit is Joule (J).	Its SI unit is watt (W).

(b) As we know, power, $p = \frac{V^2}{R}$

So resistance is inversely proportional to the power. Therefore,.

40 W lamp shall have higher electrical resistance, when in use.

(c) The commercial unit of electrical energy is kilowatt-hour.

$$1\ \text{kWh} = 1000\ \text{J/s} \times 3600\text{s}$$
$$= 3600000$$
$$= 3.6 \times 10^6\ \text{J}.$$

17. (a) Priya is suffering from hypermetropia.

(b) The causes of this defect are :

(i) Focal length of eye lens becomes large.

(ii) Eyeball becomes too short so that the image is formed behind the retina.

(c) The doctor prescribed Priya to use convex lens.

(d) The values exhibited by Priya's father are kindness, compassion and concern for others.

Or

(a) (i) 6 cm; Between focus and pole.

(b) (iii) 16 cm; At the centre of curvature.

(c) (iii) 16 cm; Between centre of curvature and focus.

(d) (iv) 23 cm; beyond centre of curvature.

18. (a) Reaction of nitric acid with metals generally does not evolve hydrogen gas because it is in an oxidising agent. It oxidises hydrogen to water and itself gets reduced to oxides of nitrogen or ammonium nitrate.

(b) Zinc oxide is generally considered as amphoteric oxide because it shows both acidic as well as basic character. Zinc oxide can react with acid as well as with base.

$$ZnO(s) + 2HCl\ (l) \longrightarrow ZnCl_2 + H_2O(l)$$

$$ZnO(s) + 2NaOH\ (aq) \longrightarrow Na_2ZnO_2 + H_2O(l)$$

(c) Carbon is not used to reduce the oxide of aluminium to get the metal because aluminium oxide has strong affinity for oxygen than carbon.

(d) Copper does not react with dilute sulphuric acid because it is less reactive than hydrogen and therefore, cannot displace hydrogen from acids.

(e) The reaction is not possible because copper is more reactive than silver and silver cannot replace copper from its solution.

19. (a) The electronic configuration of calcium is 2, 8, 8, 2. It has two electrons in its outermost shell, so, its valency is 2.

(b) Calcium is more reactive than Mg because reactivity increases down a group due to increase in atomic size.

(c) Calcium will be smaller than Potassium (K).

(d) The electronic configuration of calcium is 2, 8, 8, 2.

(e) Group : 2 Period : 4

20. *Urethra* : The urethra is the tract that carries urine from the bladder to outside of the body.

(i) *Testes* : Testes are oval-shaped primary reproductive organs in men. The function of testes is to produce sperms and male sex hormone testosterone. The scrotum provides optimal temperature for the formation of sperms.

(ii) *Seminal vesicle* : Seminal vesicles are a pair of thin-walled muscular elongated sac which secrete fluid for nourishment of sperms.

(iii) *Vas deferens* : The sperms are carried by a long tube called vas deferens to organs called seminal vesicles where the sperms get nourishment, and stored.

(iv) *Ureter* : It is the tube that carries urine from kidney to the urinary bladder. In humans, there are two ureters, one attached to each kidney.

(v) *Prostate gland* : Prostate gland produce a fluid which is released in the urethra alongwith the secretion of seminal vesicles for nourishment and transportation of sperms.

21. Three endocrine glands with their function in human body are as follows :

(i) *Thyroid gland*

Functions : It secretes a hormone called thyroxine which regulates the metabolism of carbohydrates, fats and proteins in the body and provide the necessary requirement for growth.

(ii) *Adrenal glands*

Functions : It secretes two hormones—adrenalin and corticoids hormones which regulate blood pressure, heart beat, breathing rate, carbohydrate metabolism and mineral balance.

(iii) *Pancreas*

Functions : It secretes two hormones—insulin and glucagon. Insulin hormone lowers the blood glucose. Glucagon hormone increases the blood glucose.

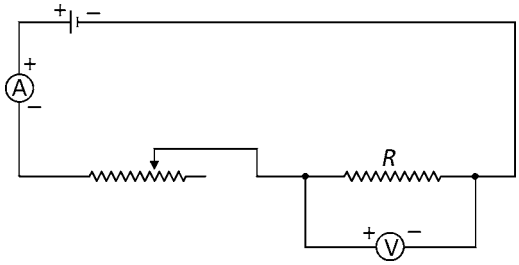
Or

(a) Plant hormones are the fluids which are secreted within the plant also known as phytohormones. Plant hormones regulate the growth and development of the plant. ex : auxin, gibberellins cytokinins etc.

(b) When tendrils come in contact with any support, the part of the tendril in contact with the object does not grow as rapidly as the part of the tendril away from the object. This is caused by the action of auxin hormone. Less auxin occurs on the side of contact as compared to the free side as a result, auxin promotes growth on the free side and the tendrils coil around the support.

(c) When someone is in danger or in emergency then adrenal gland secrete adrenaline hormone. It is secreted directly into the blood and is transported to different parts of the body. It speeds up the heartbeat and hence supplies more oxygen to the muscles. This results in increasing breathing rate and blood pressure which enable them to fight with such urgent situation.

22.



23. Image formed will be real, erect and enlarged, at infinity. For practical purposes it will give rise to a powerful parallel beam of light, So this arrangement can be used in searchlights.

24. Respiration is completely a cellular process because the major events of respiration occur in the mitochondria of the cells. Water in the form of water vapour is released apart from the carbon dioxide.

25. (a) We should use only partially germinated seeds.

(b) While opening the cotyledons, we should take great care, so that embryonic axis remains attached to the cotyledons.

Or

Germination is the process in which the seed breaks apart, and the embryo inside begins to grow with the help of water and nutrients from the soil. Seeds normally begin to germinate when they get an appropriate range of soil, temperature and when water and oxygen are available. During germination the seeds absorb water either through the micropyle (pore like opening), if it is present, or through the testa (outer seed coat) when it is permeable. The entry of water activates the embryo cells.

If the given seed have two large, oval shaped cotyledons then it is a dicot seed. ex : gram seed and bean seed.

26. *Calcium Salt* : Calcium chloride ($Cacl_2$)and Calcium sulphate ($CaSO_4$)

Magnesium Salt **:** Magnesium chloride ($Mgcl_2$) and Magnesium sulphate ($MgSo_4$).

27. Sample B with pH 2.0 is more sour than sample A. It is because lesser the pH value of a solution more is the concentration of H^+ ions and more will be acidic in nature.

Sample Paper-11

Answers

1. *Advantage*—Geothermal energy can be harnessed round the year, is cheaper to produce and does not cause pollution.

Limitation—There are very few commercially viable sites where geothermal energy can be harnessed.

2. The cross between two individuals with one pair of contrasting characters is called monohybrid cross.

3. Two ways employed to prevent rusting of iron are as follows :

(a) *By applying a layer of paint on the iron article*—On applying a layer of paint on an iron article, it will cut off oxgyen and moisture to the iron surface and thus, prevent it from rusting.

(b) *By galvanisation of iron*—The iron article is coated with a layer of zinc. Zinc, being more reactive than iron, undergoes oxidation in order to prevent iron from rusting and this process is called galvanisation.

4. (a) Concave mirror : Concave mirrors can produce powerful parallel beam of light when the light source is placed at their principal focus.

(b) Convex mirror : Convex mirrors give a virtual, erect, and diminished image of the objects placed in front of it. Because of this,they have a wide field of view. It enables the driver to see most of the traffic behind him/her.

5. (a) Thyroxine hormone by thyroid gland.

(b) Testosterone hormone by testes.

(c) Prolactin hormone by pituitary gland.

6. (a) While making dough, a little quantity of baking soda is added to the flour. When dough is heated to make bread or cake, sodium hydrogen carbonate (baking soda) decomposes to release carbon dioxide which slowly bubbles out making the bread or cake to rise. This makes bread soft and spongy.

(b) The common fire extinguisher contains sodium hydrogen carbonate and a bottle of sulphuric acid. When the nozzle of the fire extinguisher is struck on a hard surface, the bottle breaks and the acid reacts with baking soda, liberating carbon dioxide with pressure. When this carbon dioxide is directed over a small fire, it forms an umbrella over the fire which cuts off air in order to extinguish fire because carbon dioxide is neither combustible nor supports combustion.

(c) No, it is slightly more than 7 as the solution of baking soda is slightly alkaline.

7. The reaction in which heat energy is released is called an exothermic reaction. The heat released is shown by a plus sign on the right-hand side of the equation.

For example,

$$CH_4(g) + 2O_2(g) \rightarrow CO_2(g) + 2H_2O(g) + \text{Heat}$$

The reaction in which heat energy is absorbed is called endothermic reaction. The heat absorbed is shown by a plus sign on the left-hand side of the equation or by a negative sign on right-hand side of the equation. For example,

$$C(s) + H_2O(g) + \text{Heat} \rightarrow CO(g) + H_2(g)$$

or

$$N_2(g) + O_2(g) \rightarrow 2NO(g) - \text{Heat}$$

Or

(a) Decomposition reactions are those in which a compound breaks down to form two or more substances. These reactions require a source of energy to proceed. Thus, they are the exact opposite of combination reactions in which two or more substances combine to give a new substance with the release of energy.For Example :

Decomposition Reaction :

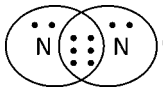
$$\underset{\text{Calcium carbonate}}{CaCO_3(s)} \xrightarrow{\Delta} \underset{\text{Calcium oxide}}{CaO(s)} + \underset{\text{Carbon dioxide}}{CO_2(g)}$$

Combination Reaction :

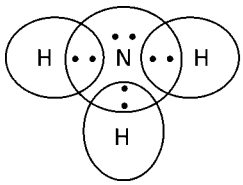
$$CaO(s) + H_2O\ (l) \rightarrow Ca(OH)_2\ (aq)$$

(b) Oil and fat containing food items flushed with nitrogen because nitrogen acts as an antioxidant and it prevent them from being oxidised.

8. (a) The element X is nitrogen with atomic number 7. Its electronic configuration is 2, 5 and it contains 5 valence electrons. Hence it belongs to group 15.

(b) 

One Triple covalent bonds is Present

(c) 

3 Single covalent bonds are Present

9. Given, power, P = 2kW = 2000 W and voltage, V = 220 V

$\therefore$ Current flowing through the coil of the electric oven,

$$I = \frac{P}{V} = \frac{2000}{220} = 9.1\ A$$

Since, the fuse used in the circuit is of current rating of 5A and the current in the circuit is more, hence, the fuse will melt and break the circuit. Therefore, the oven will not work.

Or

In an electric circuit, the earth wire acts as a safety measure. In an electrical appliance with a metallic body, if there is some leakage of electric current to the metallic body, then the person using the appliance will get a shock on touching it. To avoid it, the earth wire is connected to the metallic body of the appliance. Since, the earth wire provides a low resistance conducting path for current, the leaking current passes to the earth through it and the person using the appliance does not get a shock.

10. Disadvantages of using biomass as a fuel in conventional manner :

(a) Calorific value of fuel is low.

(b) A lot of heat energy produced on burning biomass is wasted in conventional chulhas and furnances.

(c) A lot of smoke is produced during burning of biomass and generally there is an incomplete combustion.

To improve the efficiency of these fuels, we should use modern smokeless chulhas having higher heat efficiency and producing less smoke. Alternatively, wood may be converted into charcoal by burning wood in a limited supply of air. Charcoal is a much better fuel than wood. The best technique is to use biomass to produce biogas in a biogas plant and then use biogas as the fuel.

11. (a) When a wire of resistance R is cut into 3 equal parts, the resistance of each part is $\frac{R}{3}$. When these three parts are connected in parallel, then equivalent resistance,

$$\frac{1}{R_p} = \frac{1}{R/3} + \frac{1}{R/3} + \frac{1}{R/3}$$

$$= \frac{3}{R} + \frac{3}{R} + \frac{3}{R} = \frac{9}{R}$$

$$\frac{1}{R_p} = \frac{R}{9}$$

(b) The resistivity of the parallel combination of these 3 parts of the given wire will remain unchanged because resistivity of a material is independent of its dimensions.

12. (a) As the power of the corrective lens (P = –1.25 m) is negative, Anushka is suffering from myopia or short sightedness.

(b) Focal length of the lens, $f = \frac{1}{P} = \frac{1}{(-1.25)} \text{m} = -0.8 \text{ m}$

(c) Diverging lens.

13. (a) There should be two different coloured garbage bins so that biodegradable waste and recyclable waste can be disposed off separately.

(b) To conserve energy in our school, one should make way for natural sunlight in the classrooms as much as possible to reduce consumption of electricity.

(c) Cars carrying only one child should not be allowed to come near the school gate. Only school buses, bicycles and cars carrying three or more children should be allowed to come near the gate.

14. (a) Analogous organs, because wings of butterfly and wings of a bat resemble in appearance and perform the same function but their origin is different. Wings of butterfly are outgrowth of intergument, while wings of bat are modified forelimbs.

(b) Homologous organs, because forelimbs of frog and human have same basic structure but have different appearance and perform different functions. In frog, forelimbs are modified for hopping and in human beings, they are modified for grasping.

15. (a) *Digestion of carbohydrates* :

(i) *In mouth*—The enzyme salivary amylase present in saliva acts upon starch of food and converting it into maltose.

(ii) *In stomach*—No digestion of carbohydrates occurs as there is no enzyme for digestion of carbohydrates.

(b) *Digestion of proteins :*

(i) *In mouth*—No digestion of proteins as no protein digesting enzymes occurs here.

(ii) *In stomach*—Enzyme pepsin secreted by gastric glands acts upon protein part of food and converting it into peptones and proteoses.

(c) *Digestion of fats* :

(i) No digestion of fats occurs in mouth due to absence of fat-digesting enzyme and very small amount of fat is digested in stomach.

(ii) *In small intestine*—The fats are emulsified by bile juice in which large fat molecules are broken down into small fat globules which are acted upon by the enzyme lipase present in pancreatic juice. Fats are digested into fatty acids and glycerol.

Or

The mechanism of photosynthesis occurs in following steps :

(a) *Absorption of light energy by chlorophyll*—The chlorophyll molecules absorb light energy and get activated.

(b) *Conversion of light energy into chemical energy and splitting of water*—The activated chlorophyll helps in the formation of ATP and breaks the water molecules into hydrogen and oxygen. This oxygen release into air.

(c) *Reduction of carbon dioxide into carbohydrates*—The chemical energy produced in this process is used in the reduction of carbon dioxide to form carbohydrates (glucose).

The mechanism of photosynthesis can be summarised as below :

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

16. (i) (a) Here, carboxylic acid is ethanoic acid.

(b) Here, alcohol is ethanol.

(c) Here, the compound X is ethyl ethanoate

$$\underset{\text{Ethanoic acid}}{CH_3COOH} + \underset{\text{Ethanol}}{C_2H_5OH} \longrightarrow \underset{\text{Ethyl ethanoate}}{CH_3COOC_2H_5} + H_2O$$

(ii) Since the compound 'X' gives fruity smell when treated with alcohol in the presence of conc. H_2SO_4, it must be an organic acid because when an organic acid is added to an alcohol, ester is formed which is identified by fruity smell, So, 'X' is CH_3COOH (ethanoic acid).

The chemical equation of this reaction is as follows :

$$\underset{\text{'X'}}{CH_3COOH} + C_2H_5OH \xrightarrow{\text{conc.}\,H_2SO_4} \underset{\text{Ethyl acetate (Ester)}}{CH_3COOC_2H_5} + H_2O$$

Or

(a) Platinum, gold, and silver are used to make jewellery because they are very lustrous. and also they are very less reactive and do not corrode easily.

(b) Sodium, potassium, and lithium are very reactive metals and react very vigorously with air as well as water. Therefore, they are immersed in kerosene oil in order to prevent their contact with air and moisture.

(c) Though aluminium is a highly reactive metal, it is resistant to corrosion. This is because aluminium reacts with oxygen present in air to form a thin layer of aluminium oxide. This oxide layer is very stable and prevents further reaction of aluminium with oxygen. Also, it is light in weight and a good conductor of heat. Hence, it is used to make cooking utensils.

(d) Carbonate and sulphide ores are usually converted into oxides during the process of extraction because metals can be easily extracted from their oxides rather than from their carbonates and sulphides.

(e) Metals which have low reactivity such as silver, gold does not corrode easily.

17. (a) Eka-silicon is germanium and Eka-aluminium is gallium.

(b) Germanium (Ge) belongs to group 14 and Gallium (Ga) belongs to group 13. Both elements belong to period 4 of the modern periodic table.

(c) Gallium is a metal and Germanium is a metalloid.

(d) Gallium contains 3 valence electrons and Germanium contains 4 valence electrons.

18. Let a current I be flows through a resistance R for time *t*.

Total charge flown, $Q = It$

and work done to pass one unit of charge across the resistor.

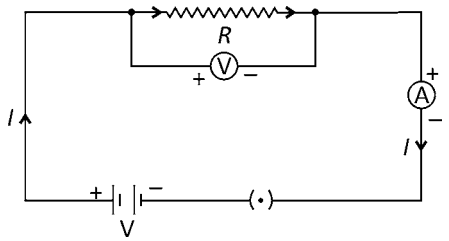
= Potential difference V across the resistor = IR

$\therefore$ Total work done, $W = QV$

$= (It)(IR)$

$= I^2 Rt.$

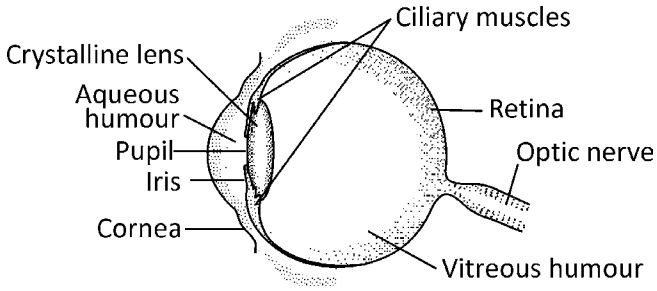
To complete this work, the electricity source supplies an equal amount of electrical energy E, *i.e.*, $E = W = I^2 Rt$



The electrical energy consumed reappear as heat energy.

Hence, amount of heat generated, $H = I^2 Rt$ J. The result $H = I^2 Rt$ is known as Joule's law of heating.

19. The eye consists of an approximately spherical eyeball of about 2.3 cm diameter. The front portion of eyeball is convered by a transparent protective membrane cornea. Most of the refraction of light rays entering the eye occurs at cornea itself.



The iris, a coloured muscular diaphragm, is situated behind the cornea and there is a small hole called pupil. Pupil appears black as any light falling on it goes into the eye. The amount of light entering into eye is controlled by varying the size of pupil. When light intensity is more, the iris contracts the pupil in order to allow less light to go in. When the light intensity is low, the iris increases the size of pupil in order to allow more light to go in.

The eye lens, a transparent crystalline structure, works like a biconvex lens. The curvature and hence, focal length of eye lens can be altered by ciliary muscles.

Retina covers the inside of the rear part of the eyeball, where the light is focused after refraction from eye lens. So, retina acts as a screen in forming the image in the eye. Retina contains a large number of light sensitive cells called receptors. These cells generate electrical signals when light is falling on them. Optic nerve connects the retina to electrical signals to perceive the object as it is.

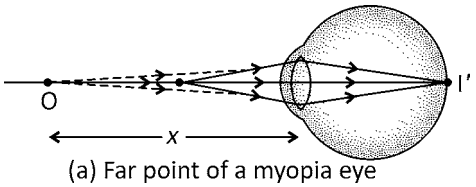
The ability of eye lens to adjust its focal length in order to see objects located at different distances from the eye is called accommodation of eye. When eye is focussed on a distant object, ciliary muscles are fully relaxed and focal length of eye lens is maximum and parallel beam coming from distant object is focussed on the retina. When eye is focussed on a nearby object, ciliary muscles contract so that eye lens becomes thicker and its focal length decreases. Therefore, the image of nearby object is focussed on the retina.

Or

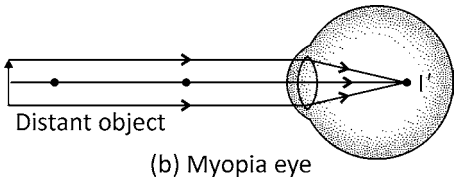
Placenta is the physiological connection between the embryo and the uterine wall of mother. It is a disc-shaped structure embedded in the uterine wall. The foetal part of placenta is formed of villi which lie embedded in maternal blood spaces. Placenta performs following functions :

- It provides nutrition and oxygen to the foetus from mother's blood.
- It removes carbon dioxide and nitrogenous wastes from the blood of foetus.

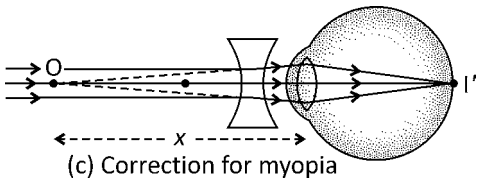
20. A person suffering with myopia can see nearby objects clearly but, cannot see distant objects clearly. Thus, the far point of defective eye has shifted from ∞ to point o, closer to the eye, placed at a distance *x* from the eye as shown in fig. (a). It happens when curvature of eye lens is too large, lens is too thick and its focal length is too short.



(a) Far point of a myopia eye



(b) Myopia eye



(c) Correction for myopia

Thus, as shown in the given diagram, image I of an object placed at O or nearer (*i.e.*, $u \leq x$) is formed on retina. But, for a parallel beam of light coming from a distant object, the image is formed before the retina as shown in fig. (b) and the distant object is not seen clearly by the eye.

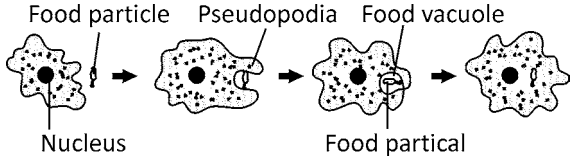
To correct the myopic defect, one should use concave lens of suitable power. The concave lens forms a virtual image of the distant object at the far point O of the defective eye as shown in fig. (c). Light rays diverging from point O are focussed by the eye lens at I on the retina and therefore, the eye can see the object clearly.

Since a girl is using spectacles of focal length –80 cm, she is suffering from myopia because concave lens is used to correct myopia.

$\therefore$ Power of her lens, $$P = \frac{1}{f(\text{in m})} = -\frac{1}{\frac{80}{100}\text{m}} = -1.25 \text{ D}$$

21. (a) Nutrition in Amoeba

Pseudopodia serves the purpose of locomotion apart from nutrition.



(b) The salivary gland is associated with digestion of starch in human digestive tract. It secretes saliva with the help of enzyme salivary amylase which converts starch into maltose (sugar).

(c) Gastric glands present on the walls of the stomach release HCl. HCl creates an acidic medium, which facilitates the action of enzyme pepsin. Bile juice from liver makes the food alkaline in small intestine for the pancreatic enzymes to act.

22. Acetic acid reacts with sodium carbonate to produce a salt called sodium ethanoate, carbon dioxide gas and water.

$$\underset{\text{Sodium Carbonate}}{Na_2CO_3} + \underset{\text{Acetic Acid}}{2CH_3COOH} \longrightarrow \underset{\text{Sodium ethanoate}}{2CH_3COONa} + \underset{\text{carbon dioxide}}{CO_2} + \underset{\text{water}}{H_2O}$$

23. (i) Ethanoic acid has a distinct sour taste.
(ii) It is soluble in water in all proportions.

24. The splitting of a beam of white light into its constituent colours when it passes through a dispersive medium like a glass prism is called dispersion of light.

25. As total resistance of the combination of resistors of resistances $R_1 = 4\Omega$ and $R_2 = 6\Omega$ is even less than the smaller individual resistance of 4Ω, so the two resistors are connected in parallel arrangement.
The net resistance R should have a value.

$$R = \frac{R_1R_2}{(R_1+R_2)} = \frac{4 \times 6}{4 + 6} = \frac{24}{10} = 2.4\Omega$$

Or

Household electric appliances should be connected in parallel so that each appliance operates at same voltage and draws current as per its resistance. Moreover, separate on/off switch can be arranged with each appliance.

26. The function of digestive enzymes is breaking down of complex food particles into simple ones. Some of the digestive enzymes are such as amylase, lipase, pepsin, trypsin, etc. These simple particles can be easily absorbed by the blood and are transported to all the cells of the body.

27. Complete oxidation of food takes place during aerobic respiration whereas incomplete oxidation of food takes place during anaerobic respiration, hence, in comparison to anaerobic respiration, more amount of energy is produced during aerobic respiration.

Sample Paper-12

Answers

1. X = Primary consumers (herbivores)
Z = Tertiary consumers (secondary carnivores).

2. All the signals and responses which pass from and to the brain through the spinal cord will get disturbed. Reflex actions will also get disrupted.

3. Addition of oxygen or removal of hydrogen by a species is called its oxidation. In the given reaction :
(a) Carbon is oxidised to carbon monoxide, and
(b) Zinc oxide (ZnO) is reduced to zinc (Zn).

Reduction

$$ZnO + C \longrightarrow Zn + CO$$

Oxidation

4. Short-sightedness/myopia

5. (i) In the process of evolutions they have been modified to perform different functions.
(ii) Homologous organs.

6. (i) The compound is bleaching powder. The chemical formula of Bleaching powder is ($CaOCl_2$).
(ii) $Ca(OH)_2 + Cl_2 \longrightarrow CaOCl_2 + H_2O$
(iii) (a) It is used as bleaching agent in textile industry.
(b) It is also used in paper industry.

Or

(a) The chemical name of bleaching powder is Calcium oxychloride.
(b) Bleaching powder on coming in contact with moist air containing carbon dioxide gives chlorine gas. Thus, it smells chlorine gas.
(c)

$$\underset{\text{Bleaching Power}}{CaOCl_2} + CO_2 \longrightarrow \underset{\text{Calcium Carbonate}}{CaCO_3} + Cl_2$$

7. We know there is a relation between valence electron and valency.
Valence electron 12345678
Valency 123453210

Element	*Group Number*	*Valency*
A	Group 13	3
B	Group 14	4
C	Group 2	2

8. (a) Sodium carbonate is obtained from baking soda and is used to remove hardness of water.
(b) Na_2CO_3.
(c) It changes to washing soda, $Na_2CO_3.10H_2O$.

9. Glucose is the simplest molecule that enters a series of reactions called Glycolysis and Kreb's Cycle to produce energy. Proteins and fatty acids are broken down and enter the cycle at different regions. Amino acids, depending upon the length of the carbon chain, enters the Kreb's Cycle at different places. Lipids are first converted into fatty acid then into acetyl CoA which enters the Kreb's Cycle.

During glycolysis, pyruvate is formed. In living organisms, the three pathways of breakdown of pyruvate are as follows :

(a) *In presence of Oxygen*—The breakdown of pyruvate in presence of oxygen takes place in mitochondria in which pyruvate breaks into 3 molecules of carbon dioxide and water. It yields a large amount of energy. This process is called aerobic respiration.
(b) *In absence of Oxygen*—The breakdown of pyruvate in absence of oxygen occurs in cytoplasm which yields very less amount of energy. It is called anaerobic respiration. The anaerobic breakdown of pyruvate yields ethanol and carbon dioxide.
(c) *Lack of Oxygen*—The lack of oxygen at the time of pyruvate breakdown yields lactic acid with very less amount of energy. It occurs in muscles.

Or

Transpiration is important for plants because :

(a) It creates a suction force which helps in the absorption and upward movement of water and minerals from roots to leaves.
(b) It prevents the plant parts from heating up by lowering the temperature.
(c) It helps in the removal of excess of water from the plant.

10. In feedback mechanism, the amount of a particular hormone in the body regulates its further production or release. In some cases, the product of target tissue controls the release of hormone by the respective endocrine gland. The feedback may be negative or positive.

In negative feedback, the end-product conveys the message to secrete no more or slow down the secretion. In positive feedback, the end-product asks for more secretion. For example, when sugar level in blood rises, the endocrine part of pancreas, *i.e.*, islets of langerhans cells secretes more insulin hormone to convert extra blood sugar into glycogen. As the blood sugar level falls, insulin secretion is brought down to normal level.

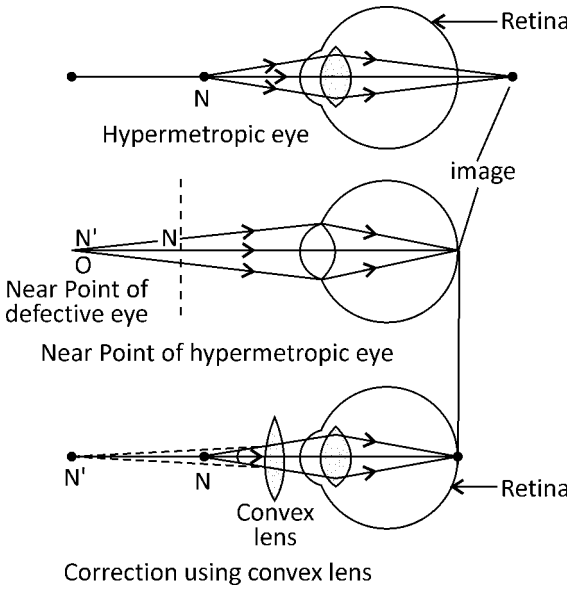
11. (a) Wind and Solar energy.
(b) I do not agree with the protesters due to the following reasons:
  (i) There is a huge supply demand of electrical power in India which can be fulfilled only by nuclear power plants.
  (ii) Power plants using coal and petroleum as fuel creates heavy air pollution. Nuclear fuel is a clean fuel and does not spread much pollution to air.
(c) India can take the following precautions to avoid Fukushima type incidents :
  (i) To use the best and safest technology available in the world to make the nuclear power plants.
  (ii) Not to install the nuclear power plants in a highly seismic zone.

12. A person suffering with hypermetropia (long sightedness) can see distant objects clearly but is unable to see nearby objects distinctly. In this case image is formed behind the retina.

Two causes of hypermetropia are as follows :

(i) The curvature of the eye lens is too small, as a result of which, the focal length of the eye is too long

(ii)



(iii)

Correction using convex lens

The eyeball is shortened, *i.e.*, the distance between the eye lens and retina is too small.

Hypermetropic defect can be corrected by using a convex lens as shown in the ray diagram. If an object is placed at point N = 25 cm from the eye, the convex lens forms its virtual image at far point N´ of defective eye and rays diverging from it are focussed on retina by the eye lens.

13. The rate of dissipation of electrical energy in a given electric circuit is called electric power. Its SI unit is watt (W).

Let a device of resistance R draw a current I from an electric supply source of voltage V.

Then, work done to transfer unit charge across the device = potential difference across the device = V

Charge flown through the device in unit time,

$$I = \frac{V}{R}$$

$\therefore$ Total work done, $$W = VI = V.\frac{V}{R} = \frac{V^2}{R}$$

To complete this work, electric source must supply energy and as a result, the rate of supply of electrical energy per unit time, *i.e.*, electric power = $\frac{V^2}{R}$.

14 (a) The deflection of compass needle increases because the strength of a magnetic field at a point near the conductor increases on increasing the electric current, *i.e.*, $B \propto I$.

(b) The deflection of compass needle decreases because the strength of a magentic field decreases as one moves away from a current-carrying wire, *i.e.*, $B \propto \frac{1}{r}$.

Or

(a) Since a thin beam of moving electrons constitutes a current, hence, a magnetic field is produced around it.

(b) Since neutrons are neutral particles, hence, a beam of moving neutrons does not constitute a current. Therefore, no magnetic field is produced around it.

15. (a) Three measures to conserve natural resources are :
(i) Used CFLs and LED lights instead of bulbs.
(ii) Used lights and fans whenever required.
(iii) Kept the water tap closed while brushing the teeth.
(b) Three things done to increase the pressure on natural resources :
(i) Went to school on a bike instead of bicycle.
(ii) Forgot to switch off lights and fan while going out.
(iii) Used polythene bags for carrying vegetables.

16. (a) Tungsten is used almost exclusively for filament of electric lamps because of its high melting point (3380°C).
(b) Since resistivity of an alloy is more than that of metals, an alloy does not oxidise (burn) readily even at high temperatures, so, coils of electric toasters and electrtic irons are made of an alloy rather than a pure metal.
(c) For domestic electric ciruits series arrangement is not used because of the following points :—
(i) In a series combination, the current is constant throughout the electric circuit. Therefore, same current flows through different elements of a circuit, which is impracticable. For example, we cannot connect an electric bulb of 100 W and an electric heater of 1000 W in a series because they need different values of current for proper operation.
(ii) In a series combination, even if any one component fails, the entire circuit is broken and none of the components of the circuit works.
(iii) In a series combination, it is not possible to put separate ON/OFF switch with each appliance or component.
(d) The resistance of a wire is inversely proportional to its area of cross-section, *i.e.*,

$$R \propto \frac{1}{A}$$

(e) Copper and aluminium wires are usually employed for electricity transmission because they are good conductors having extermely low values of resistivity. Consequently, energy loss during transmission is very small.

17. (a) (i) The incident ray, the refracted ray and the normal to the interface of two transparent media at the point of incidence, all the three lie in the same plane.
(ii) The ratio of sine of angle of incidence (sin i) to the sine of angle of refraction (sin r) is a constant for the given colour of light and for the given pair of media, *i.e.*,

$$\frac{\sin i}{\sin r} = \text{a constant}$$

when a ray of light travels from vaccum or air into a given medium, then the ratio of sin i to sin r is called absolute refractive index of the medium.

$$\therefore \quad \text{Absolute refractive index} = \frac{\text{Speed of light in vaccum}}{\text{Speed of light in the medium}}$$

(b) $n_A = 2.0$; $n_B = 1.5$ and $v_B = 2 \times 10^8$ ms^{-1}

(i) $\because \quad n_B = \frac{c}{V_B}$

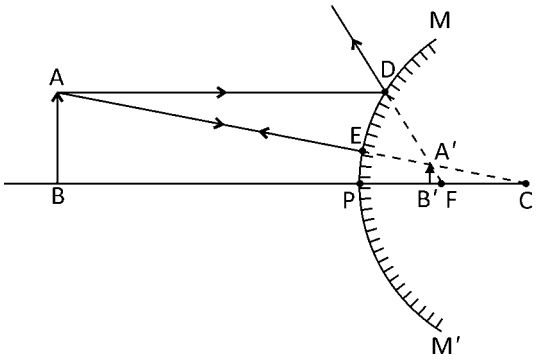
$\therefore \quad c = n_B v_B = 1.5 \times 2 \times 10^8 \text{ ms}^{-1} = 3 \times 10^8 \text{ ms}^{-1}$

(ii) ∵ $n_A = \frac{c}{V_A}$

$\therefore$ $V_A = \frac{c}{n_A} = \frac{3 \times 10^8 \text{ms}^{-1}}{2} = 1.5 \times 10^8 \text{ ms}^{-1}$

Or

(a) In this case, the mirror is a convex mirror. The required ray diagram to justify the answer is given below :



Use of convex mirror—It is used as a rear-view mirror in vehicles because it always gives an erect and diminished image of vehicle coming from behind and provides a much wider view.

(b) The radius of curvature of a spherical mirror is the radius of the sphere from which the reflecting surface of the mirror has been cut off. Alternatively, it is the distance of centre of curvature of the mirror from its pole.

Here, radius of curvature of the mirror (R) = +24 cm

$\therefore$ Focal length of the mirror (f) = $\frac{R}{2} = \frac{+24}{2}$ = +12 cm

The +ve sign shows that the mirror is convex.

18. (a) A metal cannot be extracted conveniently and profitably from all its minerals. The ore is that mineral of the metal from which it can be obtained conveniently and profitably, so, all ores are minerals but all minerals are not ores.

(b) Applying a zinc coating over iron, prevents it from rusting, is called galvanisation.

(c) Roasting is the heating of sulphide ore in excess of air

$$2\ ZnS(s) + 3O_2(g) \longrightarrow 2\ ZnO(s) + 2SO_2(g)$$

The sulphides are changed to corresponding oxides.

(d) Amalgam is an alloy of metal whose one component is mercury. For example : Alloy of Na —Hg called sodium Amalgam.

(e) Brass (Cu = 80% and Zn = 20%)

Bronze (Cu = 90% and Sn = 10%).

19. Detergents are cleansing substances that act similar to soaps but are obtained from chemical compounds other than oils and fats, *e.g.*, Sodium n-dodecyl sulphate or sodium lauryl sulphate. A detergent lathers well even with hard water.

Two advantages of detergents are as follows :

(a) Detergents work well even in hard water.

(b) Detergents have stronger cleansing action than soaps.

Two disadvantages of detergents are as follows :

(a) Most detergents are non-biodegradable.

(b) Most detergents are risky for health because they cause damage to eyes, mouth and skin.

Detergents are generally ammonium and sulphonate salts of long chain carboxylic acids which do not react with magnesium and calcium ions in water. So, it does not form insoluble precipitates with the calcium and magnesium ions and therefore no scum formation takes place and it remains effective in hard water also. Hence, detergents are suitable for cleansing the cloth in water calcium and magnesium salts.

Or

(a) Hard water often contains salts of calcium and magnesium. Soap molecules react with the salts of calcium and magnesium and form a precipitate. This precipitate begins floating as an off-white layer over water. This layer is called scum. Soaps lose their cleansing property in hard water because of formation of scum.

$2RCOONa + Ca^{2+} \longrightarrow (RCOO)_2 Ca + 2Na$

Soap Hard water scum

(b) Carbon and its compounds are used as fuels because Carbon and its compounds give large amount of heat on combustion due to high percentage of carbon and hydrogen.

(i) Carbon compounds used as fuel have optimum ignition temperature with high calorific values.

(ii) Easy to handle.

(iii) Their combustion can be controlled.

20. In man, breathing occurs in following steps :

(a) *Passage of air*—The air is taken into body through nostrils, where it is filtered by fine hairs that line nasal passage. The air from nostrils passes to lungs through trachea in throat.

(b) *Gaseous exchange*—The air from nostrils reaches to alveoli in lungs. The wall of alveoli contains a fine network of blood vessels where exchange of gases takes place, *i.e.*, oxygen from air enters into the blood and carbon dioxide is given out.

(i) During breathing in :

- Diaphragm becomes flattened.
- Ribs are lowered and taken inward.

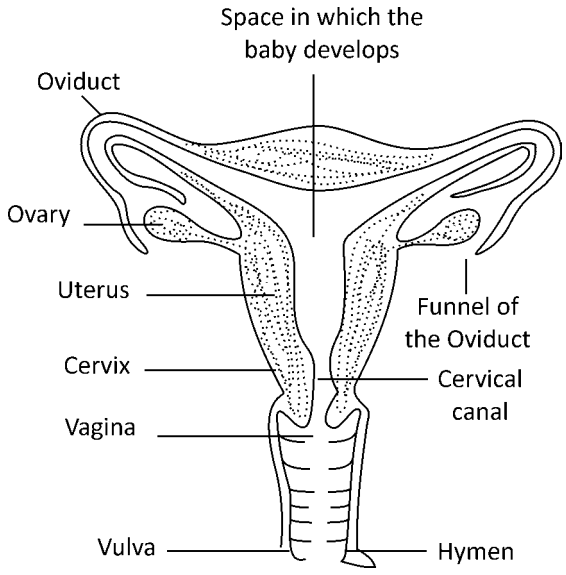
This reduces the volume of lungs and expels the air from the lungs.

(ii) During breathing out :

- Diaphragm regains its dome shape.
- Ribs are lowered and taken inward.

This reduces the volume of lungs and expels the air from the lungs.

21. The female reproductive system consists of a pair of ovaries, a pair of oviducts (fallopian tubes), uterus and vagina. A pair of ovaries lies in the lower part of the abdominal cavity, one on each side of the body. Ovaries produce ova (egg) and secrete female sex hormones, oestrogen and progesterone. One end of each oviduct is funnel-shaped. It collects the egg released by the ovary. Both fallopian tubes open into the uterus. The uterus is a pear-shaped, muscular, thick-walled organ. The lower end of the uterus opens into the vagina that opens to the outside by a genital opening. Vagina is the organ where the penis is inserted during coitus for the discharge of semen. It serves as the birth canal during childbirth. In a human female, the urethra and the genital duct have separate openings.



(a) *Functions of ovary* :

(i) Production of female hormones (oestrogen and progesterone).

(ii) Production of female gamete (egg).

Functions of oviduct :

(i) Transfer of female gamete from the ovary.

(ii) Site of fertilisation.

Functions of uterus :

(i) Implantation of embryo.

(ii) Nourishment of developing embryo.

(b) Placenta is a special disc like tissue embedded in the mother's uterine wall and is connected to the foetus/embryo.

(c) Placenta provides a large surface area for glucose and oxygen to pass from the mother's blood to the embryo/foetus.

22. The substance 'X' may be any active metal for example Zinc, Iron etc. When (Zinc) is added to dilute hydrochloric acid, hydrogen gas is liberated which burns with a 'pop' sound.

$$Zn + 2HCl \longrightarrow ZnCl_2 + H_2$$

zinc (dil) Salt Hydrogen

23. Germinating seeds respire actively at a faster rate, hence they are taken in the experiment. Boiled seeds are dead and therefore, they do not respire. If boiled seeds are taken, the very purpose of experiment will be lost.

Or

Conditions for germination of seeds are :

(i) External factors: water, oxygen and suitable temperature.

(ii) Internal factors: food and viability.

24. The preferred position of food vessel for cooking is at the focus point of concave parabolic mirror because maximum amount of solar radiation incident on mirror are focussed there.

25. (i) When key is pressed on, the galvanometer needle deflects momentarily in one direction.

(ii) When the current in the coil C_1 is switched off, the galvanometer needle deflects again momentarily but in opposite direction to that in the previous case.

26. Guard cells have elastic cell wall. When water enters guard cells, they become turgid. This results in opening of stomata and when guard cells lose water, they become flaccid. This results in closing of stomata.

27. When dilute HCl is added to copper oxide, an acid-base reaction takes place between the two forming soluble copper(II) chloride and water. The product copper chloride is responsible for colour. The equation can be given as :

$$CuO(s) + 2HCl(aq) \longrightarrow CuCl_2(aq) + H_2O(l)$$