

SOLUTIONS (Sample Paper – 1)

1. (a) Its pH = 2 due to secretion of HCl
2. (a)
3. (a)
4. (b)
5. (b)
6. (a)
7. (c)
8. (c)
9. (a)
10. (b)
11. (d)
12. (b) Yeast produces asexually by budding.
13. (b)
14. (d)
15. (a) Resistance is directly proportional to temperature of the conductor.
16. (c)
17. (a) Both A and R are true and R is the correct explanation of A.
18. (c) A is true but R is false
19. (a) Both A and R are true but R is the correct explanation of A.
20. (c) A is true but R is false.
21. (a) Double displacement as well as precipitation reaction.
(b) $\text{Pb}(\text{NO}_3)_2(\text{aq}) + 2\text{KI}(\text{aq}) \rightarrow \text{PbI}_2(\text{s}) + 2\text{KNO}_3(\text{aq})$
Yellow ppt.

OR

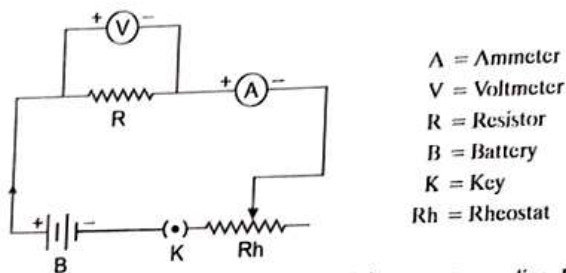
- (a) $2\text{KBr}(\text{aq}) + \text{BaI}_2(\text{aq}) \rightarrow 2\text{KI}(\text{aq}) + \text{BaBr}_2(\text{aq})$ (Double displacement reaction)
- (b) $\text{H}_2(\text{g}) + \text{Cl}_2(\text{g}) \rightarrow 2\text{HCl}(\text{g})$ (Combination reaction)
22.

	Hormone	Endocrine Glands
(a) Lowering of blood glucose -	Insulin	Pancreas
(b) Development of mustache and beard in human males -	Testosterone	Testis
23. (a) 1 – 2 Represent sperms having X and Y –chromosomes and an ovum having X-chromosomes.
2 – Represent a zygote having XX-chromosomes which will develop into a girl child and a zygote having XY-chromosomes which will develop into a male child.
(b) If a child inherits X-chromosome from the father, the gender will be a female.
24. Law of Dominance – Mendel took pea plant and carried two contrasting characters (tall and short) and cross pollination done among them. The traits which get expressed in F_1 generation are called dominant and which are unexpressed are called recessive which reappears in F_2 generation. This is called law of dominance.

OR

- Variations produced during asexual reproduction are very less because during asexual reproduction
- (i) variations are introduced only due to small inaccuracies in DNA replication.
 - (ii) There is no gamete formation, no crossing over or no exchange of hereditary material.

25. Circuit diagram.



From this circuit, the relation between voltmeter reading, V and the ammeter reading, I is

$$V \propto I \text{ or } \frac{V}{I} = \text{constant}$$

26. When green plants are eaten by primary consumers, a great deal of energy is lost as heat to the environment some amount goes into digestion and some in doing work and the goes towards growth and reproduction.
27. (a) An aqueous solution of sodium sulphate is neutral because it is formed by the reaction of strong acid –sulphuric acid and a strong base sodium hydroxide. But aqueous solution of sodium carbonate is basic in nature because it is formed from a strong base sodium hydroxide and a weak acid carbonic acid.
- (b) (i) Acidic solution = NH_4Cl
 (ii) Neutral solution = NaCl
 (iii) Basic solution = Na_2CO_3 , CH_3COONa .

28.

(a) Sulphur is a non – metal	(b) Magnesium is a metal
(i) Poor conductor of heat and electricity. (ii) Neither malleable nor ductile. (iii) Sulphur dioxide is acidic oxide. $\text{S} + \text{O}_2 \rightarrow \text{SO}_2$ $\text{SO}_2 + \text{H}_2\text{O} \rightarrow \text{H}_2\text{SO}_3$ (Sulphuric acid)	(i) Good conductor of heat and electricity. (ii) Malleable and ductile. (iii) Magnesium oxide is basic in nature. $2\text{Mg} + \text{O}_2 \rightarrow 2\text{MgO}$ $\text{MgO} + \text{H}_2\text{O} \rightarrow \text{Mg}(\text{OH})_2$ (Magnesium hydroxide)

29. (a) Functions of two components of the transport system in human beings are as follows:
- (i) Blood vessels : There are three types of blood vessels of different sizes involved in blood circulation viz. arteries, veins and capillaries, which are all connected to form a continuous closed system.
- (b) • Transpiration is the loss of water in the form of water vapours from the surface of leaf.
- (c) Significance :
- It produces cooling effect.
 - It helps in transport of water and minerals to the leaves.
 - It also helps in proper distribution of water throughout plant body.
 - It also eliminates excess water.

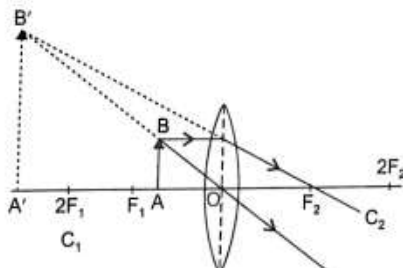
OR

Unicellular organisms can absorb sufficient oxygen because of its completer contact with the atmosphere, but in multicellular organisms the rate of absorption and diffusion through the body surface is very less because all cells are not in direct contact with atmosphere. Multicellular organisms require greater amount of oxygen to sustain life processes which cannot be fulfilled by the process of diffusion.

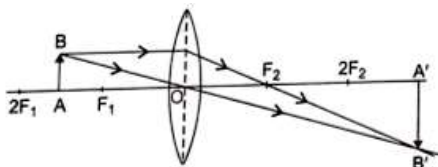
30. (a) $\angle i = 60^\circ$
 (b) $\angle r = 60^\circ - 30^\circ = 30^\circ$

(c) Refractive index of substance $X = \frac{\sin i}{\sin r} = \frac{\sin 60^\circ}{\sin 30^\circ} = \frac{\frac{\sqrt{3}}{2}}{\frac{1}{2}} = \sqrt{3}$

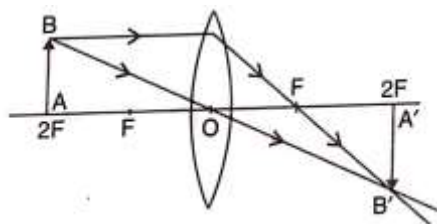
31. A convex lens of focal length 'f' can form
 (a) a magnified and erect image only when the object is placed between its focus 'F' and optical centre 'O' of the lens.



- (b) a magnified and inverted image when an object is placed in the following positions :
 Between F_1 and $2F_1$



(c)



32. (a) The iron filings arrange themselves in a particular pattern due to the force exerted by the magnet within its magnetic field, i.e., iron filings experience a magnetic force and align themselves along the magnetic field lines.
 (b) The pattern represents magnetic field lines around the bar magnet. The magnetic field lines are closed curves and the magnetic field is stronger at the poles.

OR

Two ways of increasing the strength of an electromagnet :

- (i) By increasing the current magnitude passing through the solenoid.
- (ii) By increasing the number of turns in solenoid.

33. Biodegradable substances can be broken down into simpler substances by decomposers, bacteria, saprophytes. e.g. Human Excreta, Vegetable peels, etc.

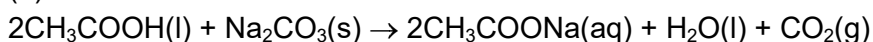
Non-biodegradable substances by nature, e.g., Plastic, glass

Habits :

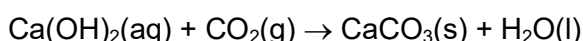
- Use of separate dustbins for biodegradable and non – biodegradable waste.
- Reuse of things such as poly-bags, etc. or cotton/jute bags can be used.

34. (a) Lime water will turn milky.

(b) Test tube A :



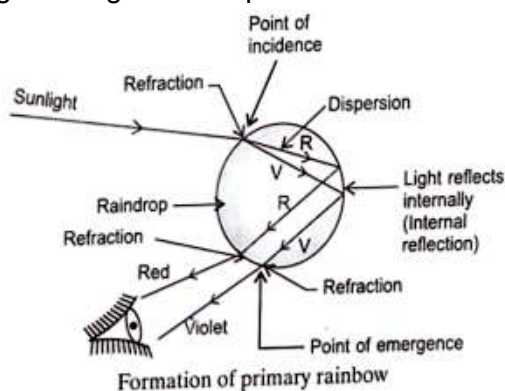
Test tube B :



(c) Ethanol will not react with Na_2CO_3 and CO_2 gas will not be formed.

(d) Add $\text{Ca}(\text{OH})_2$ in water, shake it well. Filter the solution. The filtrate is lime water.

varies with the speed of light. The different constituent colours of white light have different speeds in the transparent material of prism. Hence of each colours/wavelength, the refractive index of prism materials is different. Therefore, each colour bends (refracted) through different angle with respect to incident ray, as they pass through the prism. The red colour has maximum speed in glass prism, so it is least deviated, while the violet colour has minimum speed so its deviation is maximum. Thus, the ray of each colour emerges along different paths and becomes distinct.

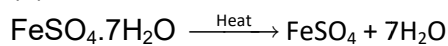


Therefore, due to refraction, dispersion and internal reflection of the sunlight, different colours reach the observer's eye along different paths and becomes distinct. It creates a rainbow in the sky. Hence, "Rainbow is an example of dispersion of sunlight".

Necessary conditions for the formation of a rainbow.

- (i) The presence of water droplets in the atmosphere, and
- (ii) The sun must be at the back of the observer, i.e., the observer must stand with his back towards the sun.

37. (a) When ferrous sulphate is heated, the green colour of crystals changes to white.



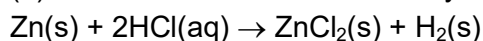
On further heating of ferrous sulphate, iron(III) oxide, sulphur dioxide and sulphur trioxide are formed.

Sulphur dioxide is the gas that has a distinctive odour of burning sulphur.

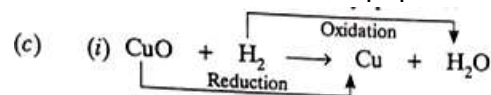


In this reaction, a single reactant (FeSO_4) breaks down in the presence of heat to give rise to simpler products. Thus this reaction is thermal decomposition.

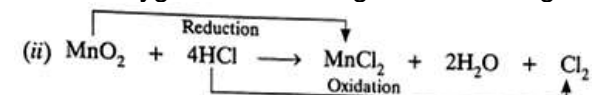
- (b) When zinc metal reacts with hydrochloric acid, hydrogen gas is liberated.



H_2 gas can be tested by bringing a burning splinter near the mouth of the test tube in which gas is collected, it will burn with a pop sound.



CuO is oxygen and is being reduced. H_2 gains oxygen and gets oxidised.



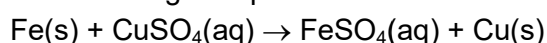
MnO_2 is reduced to MnCl_2 .

HCl is oxidised to Cl_2

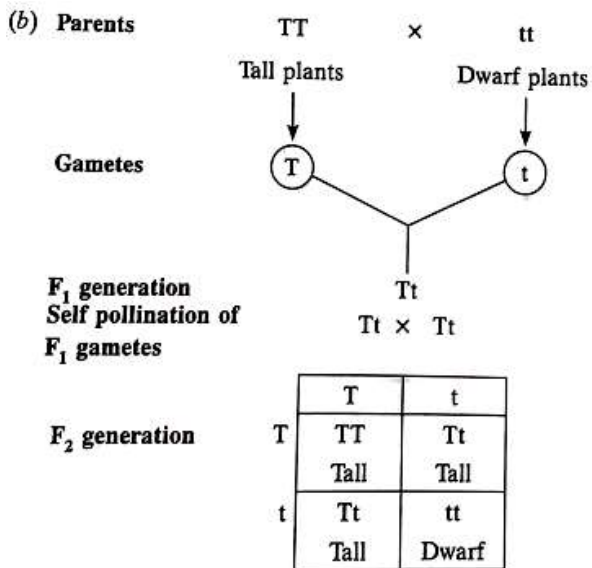
OR

(c) Copper sulphate is blue in colour. When an iron nail is dipped in this solution, the colour of copper sulphate fades and a pale yellow solution is seen. This is due to displacement of copper from its solution by an iron nail to form iron(II) sulphate.

This is a single displacement reaction.



38. (a) Monohybrid cross



(c) Geotype of

- (i) Parents $TT \times tt$
 (ii) F₂ generation $TT : Tt : tt$
 $1 : 2 : 1$

OR

- (c) Phenotypic ratio of F₁ generation – All round
 Genotypic ratio of F₁ generation – Rr
 Phenotypic ratio of F₂ generation – 3 round : 1 wrinkled
 Genotypic ratio of F₂ generation – $1 : 2 : 1$
 $RR : Rr : rr$

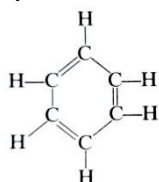
39. (a) The direction of current is from right to left.
 (b) The particles will be deflected in west direction.
 (c) As, the beam passes through magnetic field, the direction of deflection is determined by Fleming's left hand rule. According to Fleming's left hand rule, force is perpendicular to the flow of current.

OR

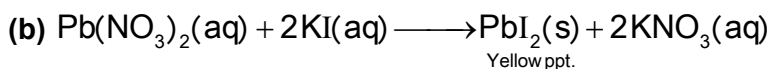
- (c) Current carrying wire exhibits properties of magnetism which indicate that electricity and magnetism are related phenomena.

SOLUTIONS (Sample Paper – 2)

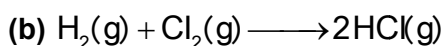
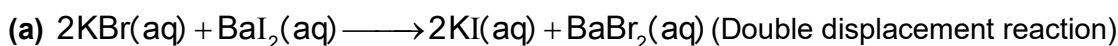
1. (b)
2. (c)
3. (b)
4. (c)
5. (b)
6. (a) $H = I^2Rt$
 $= (5)^2 \times 20 \times 30 = 25 \times 20 \times 30 = 15000 \text{ J}$
7. (d) Acids turns blue litmus to red. Salt formed between strong acid (HCl) and weak base (NH₄OH) is acidic in nature.
8. (c)
9. (b)
10. (a)
11. (d) Hydrochloric acid and sulphuric acid will conduct electricity, glucose and alcohol will not
12. (c)
13. (c)
14. (a) Cotyledons are the embryonic leaves that store food for the germination of young plant
15. (b) The structure of benzene is



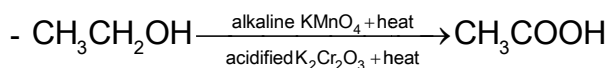
16. (a) Refractive index of water $\frac{4}{3}$
 Speed of light in vacuum = $3 \times 10^8 \text{ m/s}$
 Using $n = \frac{\text{Speed of light in vacuum}}{\text{Speed of light in water}}$
 $\Rightarrow \frac{4}{3} = \frac{3 \times 10^8}{v} \Rightarrow v = \frac{9}{4} \times 10^8 \text{ m/s}$
17. (b)
18. (a)
19. (a)
20. (b)
21. (a) Double displacement as well as precipitation reaction.



OR



22. (a) Lowering of blood glucose – Hormone Endocrine Glands
Insulin Pancreas
- (b) Development of mustache and beard in human males– Testosterone Testis
23. (a) 1 – Represents sperms having X and Y-chromosomes and an ovum having X-chromosomes
 2 – Represents a zygote having XX-chromosomes which will develop into a girl child and a zygote having XY- chromosomes which will develop into a male child.
- (b) If a child inherits X-chromosome from the father, the gender will be a female.

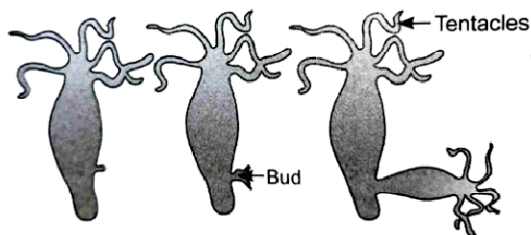


- It is an oxidation reaction while burning of ethanol is combustion reaction.

31. (a) Iron fillings are magnetic substance. They experience a magnetic force when placed in the surrounding region of a bar magnet. The force experienced by these iron fillings make them rotate and align themselves in a particular pattern, i.e. in the direction of magnetic field lines
- (b) It indicates that the strength of magnetic field lines is maximum at the poles
- (c) Magnetic field lines
- (d) – Equidistance parallel lines
– Magnetic field inside the solenoid is uniform

32. **Reproduction (Budding) in Hydra:**

- A bud develops as an outgrowth in Hydra due to repeated cell division at one specific site
- When fully mature, the bud detaches itself from the parent body and develops into new independent individual



Regenerative cells are used for budding.

OR

(a) **Seminal vesicles and possible gland**

- Secrete a fluid for nourishment of sperms
- Secrete a fluid which makes the transport easier.

(b) **Oviduct**

- Site of fertilisation
- Transports the zygote to the uterus

(c) **Testis**

- Secrete male sex hormone testosterone
- Products sperms

33. The ability of eye lens to adjust its focal length to form a sharp image of the object at varying distances on the retina, is called its power of accommodation.

- There is no change in the image distance in the eye
- Ciliary muscles are responsible for it in this case. When object distance increases, ciliary muscles relax and lens becomes thin and its focal length increases. It facilitates the distant vision.

34. (a) In S.No. 3,

$$2f = 50 \Rightarrow f = 25 \text{ cm}$$

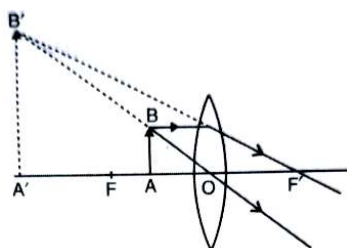
Justification

Object distance (u) and image distance (v) are same, it implies that object is placed at 2F.

- (b) S. No. 6 is not correct.

Reason

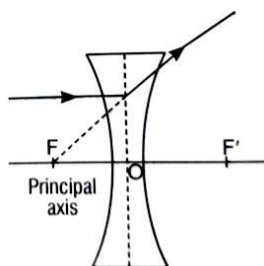
For $u = 15 \text{ cm}$, sign of v must be $-ve$ as the image is formed on the same side of the lens as the Object.



(c) Magnification, $m = \frac{v}{u} = \frac{+150}{-30} = -5$ cm

OR

(a) Principle axis of a lens is an imaginary line passing through the two centres of curvatures of a lens



(b) $f = -20$ cm, $h = 5$ cm, $v = -15$ cm

Applying lens formula

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

$$\frac{1}{u} = \frac{1}{v} - \frac{1}{f} = \frac{1}{(-15)} - \frac{1}{(-20)}$$

$$= -\frac{1}{15} + \frac{1}{20}$$

$\Rightarrow u = -60$ cm

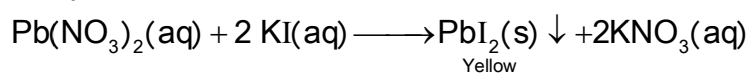
\therefore Object should be placed at a distance of 60 cm from the lens.

Size of the image; magnification(m) = $\frac{h'}{h} = \frac{v}{u}$

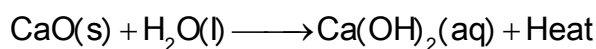
$\Rightarrow h' = \frac{v}{u} \times h = \frac{(-15)}{(-60)} \times 5 = 1.25$ cm

35. A chemical reaction involves the making and breaking of bonds between atoms to produce new substances.

(a) Add lead nitrate solution to potassium iodide solution taken in a test tube. The colour changes from colourless solution to yellow precipitate.



(b) Calcium oxide reacts vigorously with water to form slaked lime releasing a large amount of heat.



OR

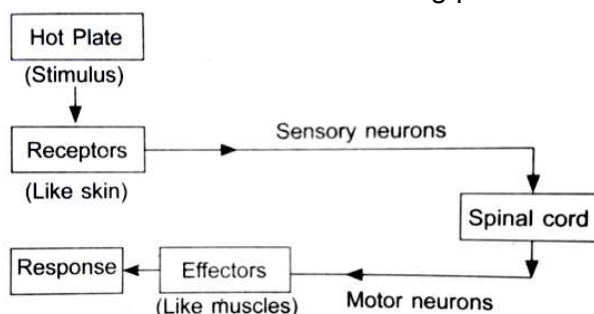
A reaction which requires energy to split a compound or reactant in two or more simple products is called decomposition reaction.

(a) It is because water splits into hydrogen gas and oxygen gas. Electrical energy is involved.

(b) It is because silver bromide decomposes into silver into chlorine. Light energy is involved.

36. (a) Reflex are is the pathway taken by the nerve impulses in a reflex action.

Reflex arcs have evolved in animals because the thinking part of the brain is not fast enough.



- (b) – Peripheral nervous system
 – **Components**
 Cranial nerves; spinal nerves

OR

- (a) – The stimulus is 'Touch'.
 – The shape of the leaves changes by changing the amount of water in them.
 – There is no growth involved in the movement
- (b) – Growth of a part of a plant in response to pull of earth or gravity is called geotropism
 – **Positive geotropism:** Movement of plant parts towards the earth gravity.
Example: Roots grow downwards.
 – **Negative geotropism:** Movement of plant part away from the earth gravity.
Example: Shoots grow upwards.

37. (a) $\frac{1}{R_{BC}} = \frac{1}{8} \Omega + \frac{1}{8} \Omega = \frac{1}{4} \Omega$

$\Rightarrow R_{BC} = 4 \Omega$

- (b) Total resistance = $26 \Omega + 4 \Omega = 30 \Omega$
 Potential difference, $V = 6 \text{ V}$

Current, $I = \frac{V}{R} = \frac{6}{30} = 0.2 \text{ A}$

- (c) 16Ω resistor will have more potential difference across its two ends.

Justification

Potential difference across 16Ω

$IR = 0.2 \times 16 = 3.2 \text{ V}$

Potential difference across 8Ω

$IR_{(\text{Total})} = 0.2 \times 4 = 0.8 \text{ V}$

38. (a) It is because nitric acid is a strong oxidising agent and oxidizes the hydrogen produced to water.
 Products formed in the reaction are water, oxides of nitrogen.

OR

- (b) Displacement reaction

If metal X displaces metal Y from its salt solution it is more reactive than Y or vice-versa.

- (c) In the test tube containing metal sample of aluminium
 (d) All metals react with HCl because they are more reactive than hydrogen.

39. (a) (i) Renal artery (ii) Glomerulus

- (b) - Urinary bladder
 - It is under nervous control

- (c) Filtration: Nitrogenous wastes such as urea or uric acid are removed
 Reabsorption: Glucose, amino acids, salts and major amount of water are reabsorbed.

OR

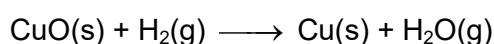
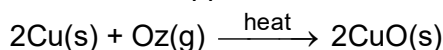
- (d) Selective reabsorption takes place in tubular part of nephron

The amount of water reabsorbed depends on:

- how much water is there in the body
- how much dissolved waste is to be excreted.

SOLUTIONS(Sample – 3)

1. (d) Salt solution contains ions which makes it conductive and allow electricity to flow through it.
2. (a) $\text{Zn(s)} + 2\text{AgNO}_3(\text{aq}) \rightarrow \text{Zn(NO}_3)_2(\text{aq}) + 2\text{Ag(s)}$
3. (c)
4. (a)
5. (a)
6. (c)
7. (c)
8. (b) Gastric glands are present in stomach. Here, B represents stomach.
9. (a)
10. (d)
11. (a)
12. (b)
13. (a)
14. (a)
15. (d) The device X is a convex lens of focal length 40 cm
16. (a) 19. (b)
17. (a) 20. (b)
18. (b)
21. Metal 'A' is copper.

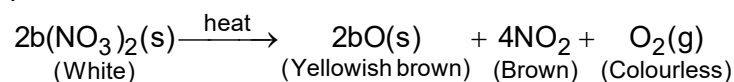


OR

Any two of these observations will suggest reaction has taken place.

- (i) Change in state. reaction has taken place.
- (ii) Change in colour.
- (iii) Evolution of gas.
- (iv) Change in temperature.

For example, lead nitrate is white crystalline solid which on heating gives yellowish brown solid (lead monoxide). A brown gas and a colourless gas is also evolved. It shows chemical reaction has taken place.



22. Primary sex organs produce the gametes and sex hormones - testes secretes testosterone and ovary secretes estrogen and progesterone.
Testosterone controls the growth, maintenance and functions of secondary sex organs like prostate gland, seminal vesicles and penis in a male.
Estrogen and progesterone controls the growth, maintenance and functions of secondary sex organs like uterus, fallopian tubes, etc.
Thus, we can justify that the primary sex organs control the growth and development of secondary sex organs.
23. Cellulose is difficult to digest and hence takes a longer time for complete digestion which is why herbivores need a comparatively longer small intestine. Meat is easy to digest and hence carnivores like tigers have a comparatively shorter small intestine.
24. Mammals and birds are warm blooded animals. This means they can control their body temperature and they need not to depend on environment for body temperature regulation. Because of this birds and mammals need optimum oxidation of glucose which is possible with good supply of oxygen without mixing of oxygenated and deoxygenated blood.

25. Given $q = 96000 \text{ C}$, $V = 50 \text{ V}$, $t = 1 \text{ h}$
 $H = I^2Rt = VIt = Vq = 50 \times 96000 = 48 \times 10^5 \text{ J}$

OR

When N resistors each of $R \Omega$ are in parallel.

$$R_p = \frac{R}{N}$$

Current drawn from cell,

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

$$\therefore N = \frac{IR}{V} = \frac{5 \times 176}{220} = 4.$$

26. DDT being a non-biodegradable pesticide will enter the food chain from the first trophic level i.e., Plankton.

Non-biodegradable pesticide accumulate progressively at each trophic level. This phenomenon is known as biological magnification.

27. (a) $\text{SO}_2 + 2\text{H}_2\text{S} \longrightarrow 2\text{H}_2\text{O} + 3\text{S}$
 Sulphur dioxide Hydrogen Sulphate Water Sulphur

Substance oxidised : H_2S

Substance reduced : SO_2

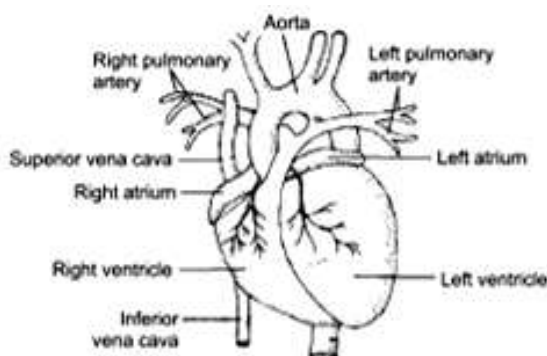
(b) H_2S is oxidised to sulphur and is a reducing agent whereas SO_2 is reduced to sulphur and is an oxidising agent.

28. Alloy is a homogenous mixture of two or more metals or a metal and a non-metal. It is prepared by first melting the primary metal and then dissolving the other elements in it in a definite proportion. It is then cooled to the room temperature.

(a) An alloy called steel is formed when iron is mixed with carbon. It becomes hard and strong.

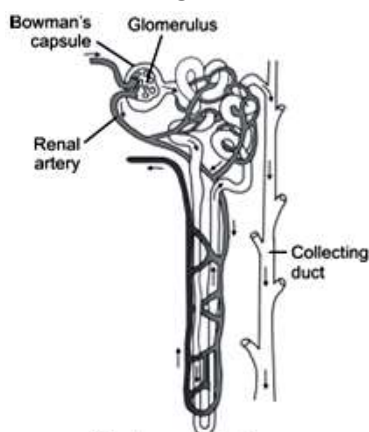
(b) On mixing iron with Ni and Cr, it becomes very hard, does not rust and is called stainless steel.

- 29.



External Structure of Human Heart

OR

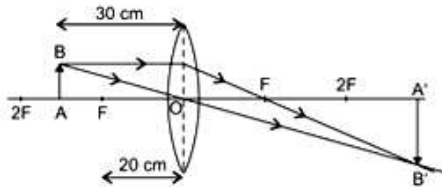


Structure of a Nephron

30. The focal length of the eye lens will be more in case (a), i.e., when ciliary muscles of a normal eye is most relaxed.
 (b) Reason : When ciliary muscles are relaxed, the eye lens becomes thin. Thus, its focal length increases.

In case when ciliary muscles is in most contracted state, radius of curvature of eye lens increases. Lens becomes thicker. This decreases the focal length of eye lens.

31. $u = -30 \text{ cm}$, $f = 20 \text{ cm}$



- (a) Using, $\frac{1}{f} = \frac{1}{v} - \frac{1}{u}$ we get,

$$\frac{1}{v} = \frac{1}{f} + \frac{1}{u} = \frac{1}{20} + \frac{1}{-30} = \frac{3-2}{60}$$

$$\Rightarrow v = 60 \text{ cm}$$

Image is formed at a distance of 60cm from the lens on the right side.

(b) $m = \frac{v}{u} = \frac{60}{-30} = -2$

So, image is inverted and double the size of the object.

- (c) Image is real as $v > 0$, inverted and enlarged.

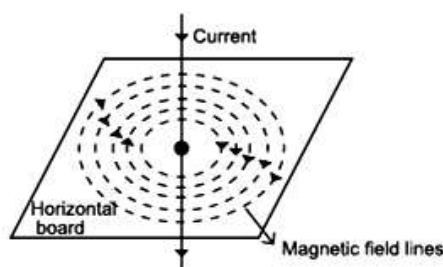
32. Magnetic field lines : It is defined as the path along which the unit North pole (imaginary) tends to move in a magnetic field if free to do so. By drawing a tangent at that point on the magnetic field lines one can find the direction of magnetic field at that point.

(a) The magnetic lines of force do not intersect (or cross) one another. If they do so then at the point of intersection, two drawn tangents at that point indicate that there will be two different directions of the same magnetic field, i.e., the compass needle points in two different directions which is not possible.

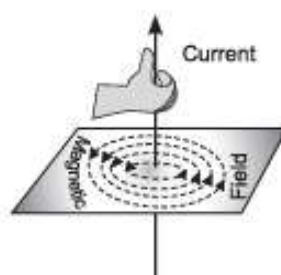
(b) Magnetic field lines are closed continuous curves. They emerge out from the north pole of a bar magnet and go into its south pole. Inside the magnet they move from south pole to north pole.

OR

- (a) Direction of magnetic field produced around a straight current-carrying conductor is given by right-hand thumb rule.



Right –Hand thumb Rule : This rule is used to find the direction of magnetic field due to a straight current carrying wire.



It states that if we hold the current carrying conductor in the right hand in such a way that the thumb is stretched along the direction of current, then the curly finger around the conductor represent the direction of magnetic field produced by it. This is known as right –hand thumb rule.

Direction of Field Lines due to current carrying straight conductor as shown in figure.

(b) Direction of force experienced by current –carrying straight conductor placed in a magnetic field which is perpendicular to it, is given by Fleming’s left hand rule.

Fleming’s left hand Rule : Stretch the thumb, forefinger and middle finger of the left hand such that they are mutually perpendicular to each other. If the forefinger pointed towards the direction of magnetic field and middle finger in the direction of current, then the thumb will indicate the direction of motion or force experienced by the conductor. It is to be applied only when the current and magnetic field, both are perpendicular to each other.

33. A stratosphere is the portion of the atmosphere located at an altitude of in between 10 to 60 km. within the stratosphere, the ozone layer is the portion that contains the highest proportion of ozone gas. Stratosphere ozone layer absorbs virtually all the ultraviolet rays, our planet receives from the sun (particularly UVa and UVa rays), which are harmful to life. Without this protective shield, no life forms could have evolved outside the oceans.

Exposure to UV rays affect our health. It is the main factor influencing the development of skin cancers.

Severe exposure to UV rays is a cause of cataracts, it is currently believed that UV rays affect our immune system, lowering resistance to various diseases and reducing the effectiveness of certain vaccines.

Plant life is effected, lower yields from some plants and cereal crops, negative effects on plant growth, falling plankton populations, which are a primary source of food in marine ecosystems.

Two steps to limit this damage are as follows :

- (i) Reduce the use of a aerosol spray propellants such as flurocarbon and chlorofluorocarbons which cause depletion or hole in ozone layer.
- (ii) Control over large scale nuclear explosions and limited use of supersonic planes.

34. **Physical properties :**

Ethanol	Ethanoic acid
(i) It has specific smell.	(i) It has vinegar like smell.
(ii) It has burning taste.	(ii) It is sour in taste.
(iii) It does not freeze in winters.	(iii) It freezes in winters.

Chemical Properties:

Ethanol	Ethanoic acid
(i) It does not react with NaHCO_3	(i) It gives CO_2 with NaHCO_3 .
(ii) It burns with blue flame.	(ii) It does not burn with blue flame.
(iii) It does not affect blue litmus.	(iii) It burns blue litmus red.

OR

(a) It is because carbon has four valence electrons, it cannot gain or lose four electrons because high energy is needed. It can only share four electrons.

(b) Diamond is a covalent solid and it is a giant molecule with a three-dimensional network of covalent bonds. Hence, it is very high melting point.

(c) It is due to presence of free electrons present between its layers. These free electrons move It is continuously within the entire layer and thus lead to conduction of electricity.

(d) It is because ethyne is an unsaturated hydrocarbon and the percentage of carbon is comparativity higher which does not get oxidised completely in air.

(e) Kerosene oil is a mixture of saturated hydrocarbons therefore does not decolourise bromine water where as cooking oil contains unsaturated hydrocarbons and decolourises bromine water.

35. (a) Transpiration is the loss of water in the form of water vapours from the aerial parts of the plant. Transpiration helps in transport of water and minerals by producing a suction force acting from the top of the plant. Loss of water from the leaves concentrates cell sap and increases osmotic

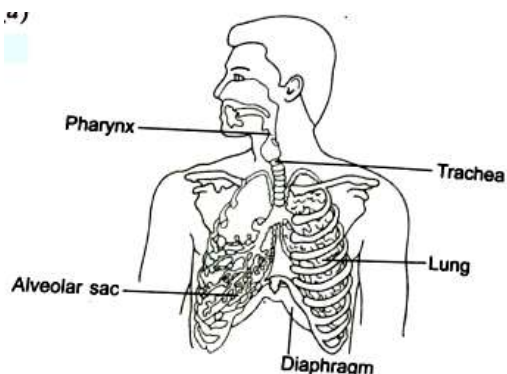
pressure. This draws water from the cells of the lower levels in a sequential manner and finally absorption of water by the root takes place from the soil.

Significance:

- (i) It produces cooling effect.
 - (ii) It helps in transport of water and minerals.
 - (iii) It also helps in proper distribution of water throughout the plant body.
 - (iv) It also eliminates excess water.
- (b) Transportation of soluble product of photosynthesis or food from leaves to other parts of plants is called translocation. Sieve tubes of phloem are involved in the transport of food in plants. For translocation, food molecules enter into the sieve tubes from where they can be transported upwards or downwards to all parts of the plant including roots.

OR

(a)

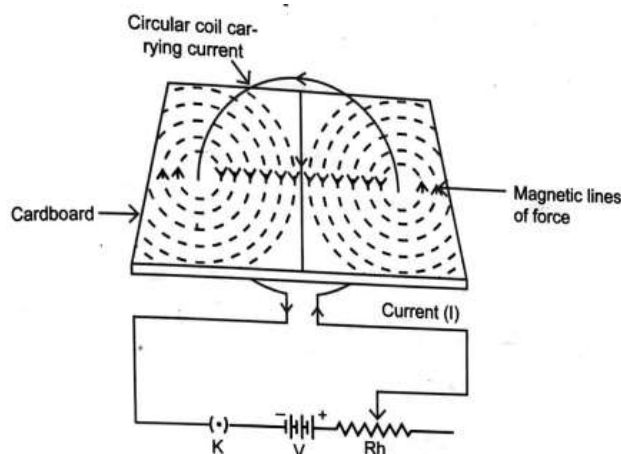


(b) **Inhalation** is brought about by contraction of diaphragm muscles and some intercostal muscles.

The diaphragm moves downward and the intercostal muscles move the lateral walls of thorax outward and upward. The volume of the thorax increases and the air pressure is decreased. So, air is drawn into the lungs.

Exhalation is brought about when the contracted muscles of diaphragm and intercostal muscles relax, the diaphragm moves upward and the lateral walls, move inward and downward. This decreases the volume of thorax and increases the air pressure. So, air is sent out of lungs.

36. (a) The figure given below shows the pattern of magnetic field lines and its distribution due to current carrying circular loop.



- The concentric circles at every point of a current carrying circular loop represent the magnetic field around it.
- Magnetic field line close to the axis of loop is straight and is perpendicular to the plane of the coil.
- Field lines keep on diverging as we move away from the centre of loop.

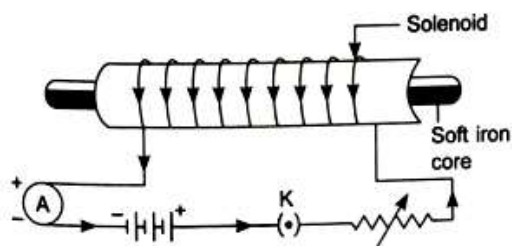
- (b) If the circular coil has n turns, the field produced is n times as large as that produced by a single turn. This is because the current in each circular turn has the same direction, and the field due to each turn then just adds up along the axis.

OR

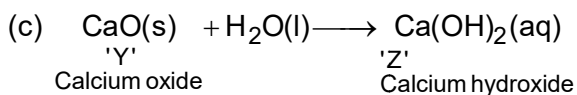
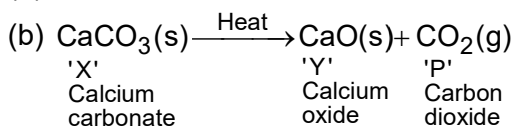
- (a) Electromagnet: It is a device consisting of an iron or steel core that is magnetised by the strong magnetic field produced by electric current passing through the coil that surrounds it i.e. solenoid.

Uses of electromagnet:

- (i) It is used to separate magnetic substance from non-magnetic substance.
 (ii) It is used in electric bells, telephone receivers, microphones, loudspeakers, television etc.
 (b)

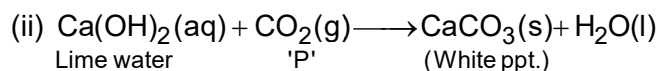


37. (a) 'X' is CaCO_3 'Y' is CaO .



OR

- (c) (i) dil. HCl (Hydrochloric acid).



38. (a) Gene is responsible for the inheritance of traits.
 (b) 9 : 3 : 3 : 1
 (c) (i) Trait appeared in F_1 generation – Dominant
 (ii) Trait hidden in F_1 generation – Recessive

OR

- (c) Both dominant and recessive when F_1 plants were self pollinated while some traits are inherited independently also.

39. (a) (i) Convex mirror
 (ii) Convex mirror has larger field of view.
 (b) The angle of incidence is between the normal and incident ray so the angle of incidence is $90^\circ - 30^\circ = 60^\circ$.

We know angle of incidence is equal to angle of reflection. Therefore, the angle of reflection will be 60° .

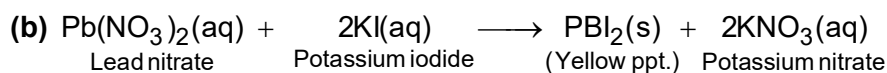
$$\angle i = \angle r = 60^\circ$$

OR

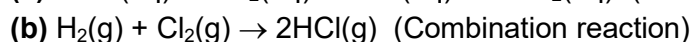
- (b) The magnification produced by a plane mirror is 1. A plane mirror can be called a spherical mirror of infinite radius of curvature.

SOLUTIONS (Sample Paper – 4)

1. (a)
2. (c) Benzene Zn is less reactive than Mg.
3. (c)
4. (b) Calcium sulphate hemihydrate ($\text{CaSO}_4 \cdot \frac{1}{2}\text{H}_2\text{O}$) is commonly known as Plaster of Paris.
5. (d) It is double displacement reaction.
6. (b) Citric acid is organic acid, not a mineral acid.
7. (c)
8. (c) Guard cells show the presence of nuclei and chloroplast.
9. (b)
10. (b)
11. (d)
12. (b) Yeast reproduces asexually by budding.
13. (d) When the ray travels from rarer to denser medium, it bends towards the normal. So, angle of refraction must be smaller than the angle of incidence i.e., $\angle r < \angle i$.
14. (d)
15. (a) Resistance is directly proportional to temperature of the conductor.
16. (c)
17. (a)
18. (a)
19. (a)
20. (c)
21. (a) Double displacement or precipitation reaction.



OR



22.

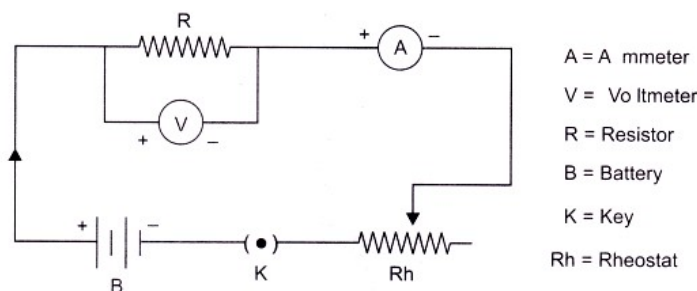
	Hormone	Endocrine Glands
(a) Lowering of blood glucose –	Insulin	Pancreas
(b) Development of moustache and beard in human males –	Testosterone	Testis
23. (a) 1 – Represent sperms having X and Y-chromosomes and an ovum having X-chromosomes.
2 – Represent a zygote having XX-chromosomes which will develop into a girl child and a zygote having XY-chromosomes which will develop into a male child.
(b) If a child inherits X-chromosome from father, the gender will be a female.
24. Law of Dominance : Mendel took pea plant and carried two contrasting characters (tall and short) and cross pollination done among them. The traits which get expressed in F_1 generation are called dominant and which are unexpressed are called recessive which reappears in F_2 generation. This is called law of dominance.

OR

Variations produced during asexual reproduction are very less because during asexual reproduction

- (i) Variations are introduced only due to small inaccuracies in DNA replication.
- (ii) There is no gamete formation, no crossing over and no exchange of hereditary material.

25. Circuit diagram



From the circuit, the relation between voltmeter reading, V and the ammeter reading, I is

$$V \propto I \text{ or } \frac{V}{I} = \text{constant}$$

26. In a food chain, when green plants are eaten by primary consumers, a great deal of energy is lost as heat to the environment, some amount goes into digestion, some in doing work and the rest goes towards growth and reproduction.

27. (a) An aqueous solution of sodium sulphate is neutral because it is formed by the reaction of a strong acid-sulphuric acid and a strong base sodium hydroxide. But aqueous solution of sodium carbonate is basic in nature because it is formed from a strong base sodium hydroxide and a weak acid carbonate acid.

- (b) (i) Acidic solution = NH_4Cl
 (ii) Neutral solution = NaCl
 (iii) Basic solution = $\text{Na}_2\text{CO}_3, \text{CH}_3\text{COONa}$.

28.

(a) Sulphur is a non-metal	(b) Magnesium is a metal
(i) Poor conductor of heat and electricity.	(i) Good conductor of heat and electricity.
(ii) Neither malleable nor ductile.	(ii) Malleable and ductile
(iii) Sulphur dioxide is acidic oxide, $\text{S} + \text{O}_2 \rightarrow \text{SO}_2$ $\text{SO}_2 + \text{H}_2\text{O} \rightarrow \text{H}_2\text{SO}_3$ (Sulphurous acid)	(iii) Magnesium oxide is basic in nature. $2\text{Mg} + \text{O}_2 \rightarrow 2\text{MgO}$ $\text{MgO} + \text{H}_2\text{O} \rightarrow \text{Mg(OH)}_2$ (Magnesium hydroxide)

29. Three types of blood vessels in human circulatory system are – Arteries, Veins and Capillaries. Their functions are tabulated below :

Arteries	Veins	Capillaries
(i) Arteries carry oxygenated blood from heart to various organs of the body.	(i) Veins carry deoxygenated blood from various organs to heart.	(i) Exchange of materials between blood and surrounding cells take place in the capillaries.
(ii) They are thick walled.	(ii) They are thin walled.	(ii) They are thin walled and extremely narrow tubes or blood vessels which connect arteries to veins.

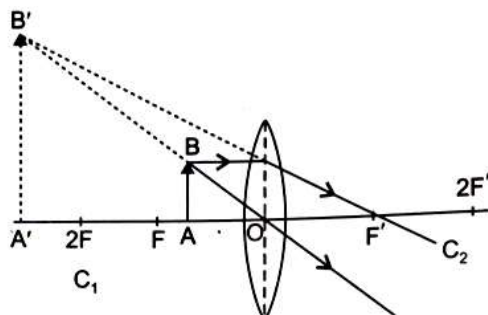
OR

- (a) Salivary glands are situated in the mouth of man and contains starch-digestive enzymes. Salivary glands secrete saliva which helps to lubricate the food for swallowing and helps in digestion of starch.
- (b) The first digestive organ that is associated with the digestion of proteins in humans is the stomach. Its releases are enzymes, HCl and mucus.

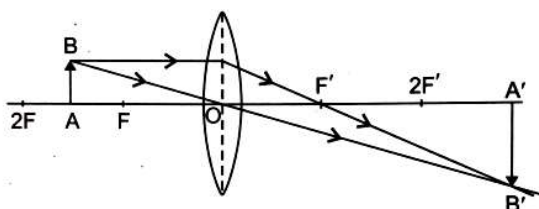
30. (a) $\angle i = 60^\circ$
 (b) $\angle r = 60^\circ - 30^\circ = 30^\circ$

(c) Refractive index of substance $X = \frac{\sin i}{\sin r} = \frac{\sin 60^\circ}{\sin 30^\circ} = \frac{\frac{\sqrt{3}}{2}}{\frac{1}{2}} = \sqrt{3}$

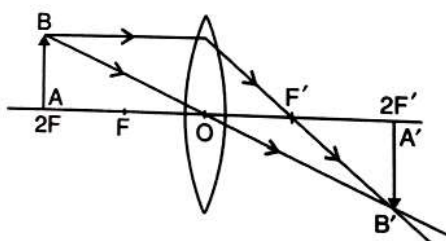
31. A convex lens of focal length 'f' can form
 (a) a magnified and erect image when the object is placed between its focus 'F' and optical centre 'O'



- (b) a magnified and inverted image on the other side of the lens which an object is placed between F and 2F



- (c) an image of the same size of the object on the other side of the lens, when an object is placed at 2F.



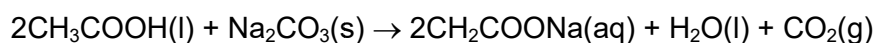
32. (a) The iron fillings arrange themselves in a particular pattern due to the force exerted by the magnet within its magnetic field, i.e., iron fillings experience a magnetic force and align themselves along the magnetic field lines.
 (b) The pattern represents magnetic field lines around the bar magnet. The magnetic field lines are closed curves and the magnetic field is stronger at the poles.
33. Biodegradable substances can be broken down into simpler substances by decomposers, bacteria, saprophytes. e.g. Human Excreta, Vegetable peels, etc.
 Non-biodegradable substances cannot be broken down into simpler substances by nature, e.g. Plastic, glass.

Habits :

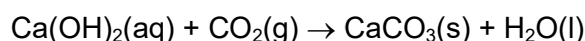
- Use of separate dustbins for biodegradable and non-biodegradable waste.
- Reuse of things such as polybags, etc. or cotton/jute bags can be used.

34. (a) Lime water will turn milky.

(b) Test tube A :



Test tube B :

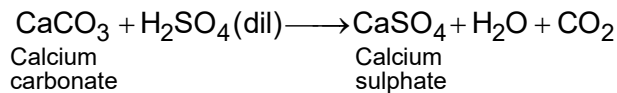


(c) Ethanol will not react with Na_2CO_3 and CO_2 gas will not be evolved.

(d) Add $\text{Ca}(\text{OH})_2$ in water, shake it well. Filter the solution. The filtrate is lime water.

OR

(a) 'X' is CaCO_3 (calcium carbonate). The gas evolved is CO_2 .



(b) (i) NaHCO_3 is antacid. It neutralises excess of acid formed in the stomach.

(ii) The soil is acidic in nature. Farmer adds quick lime to make it neutral which is good for crops.

35.

(a) A – Pollen grain

B – Pollen tube

C – Ovary

D – Female germ-cell

(b) Pollination : Transfer of pollen grains from the anther to the stigma of a flower.

Significance of pollination :

(i) It is necessary for seed formation and thus, perpetuation of species.

(ii) It stimulates the development of fruits.

(c) • After the pollen lands on a suitable stigma, it has to reach the female germ cells in the ovary.

• The pollen tube grows out of the pollen grain through the style to reach the ovary.

• Male germ cell travels through the pollen tube to reach the female germ cell and fertilises it.

• After fertilisation, the zygote divides several times to form an embryo within the ovule.

(i) Ovule becomes seed.

(ii) Ovary becomes fruit.

OR

Differences between asexual and sexual reproduction :

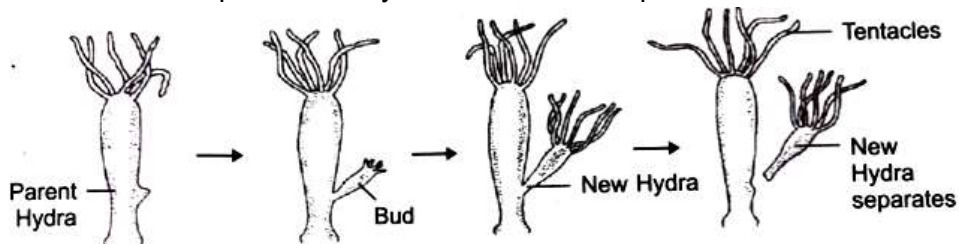
Asexual reproduction	Sexual reproduction
(i) A single parent is involved	(i) Two parents (a male and female) are involved.
(ii) There is no formation or fusion of gametes.	(ii) There is formation and fusion of gametes.
(iii) No genetic variation is created in the progeny	(iii) There is genetic variation in the progeny.

Hydra reproduces asexually by budding.

A bud develops as an outgrowth on parent body due to repeated cell division at a specific site.

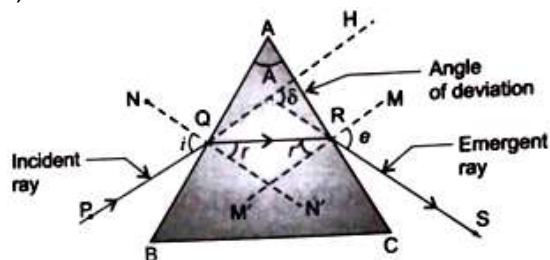
These buds develop into individuals, which detach from parent body when they mature.

In *Hydra*, the cells divide rapidly at a specific site and develop as an outgrowth called a bud. These buds, while attached to parent plant, develop into small individuals. When it becomes larger enough, it detaches itself from parent's body to exist as an independent individuals.



36.

(a)



(b) From Snell's law of refraction, the angle of refraction of light in a prism depends on its refractive index which is different for different wavelength and for different speed. Thus, each colour emerges along a different path becomes distinct, forming a spectrum.

The red colour (longer wavelength) has maximum speed in glass prism, so it is least deviated while the violet colour (shorter wavelength) has minimum speed, so its deviation is maximum:

(c) In bright sunlight, the iris contracts the pupil to allow less light to enter the eye and in dim light, the iris expands the pupil to admit more light to see the object clearly. Therefore, it takes sometime to increase the size of pupil in dim light.

OR

(a) The eye defect is myopia.

(b) Two causes for myopia are

(i) excessive curvature of eye lens (ii) elongation of eye ball

(c) Required power of corrective lens is

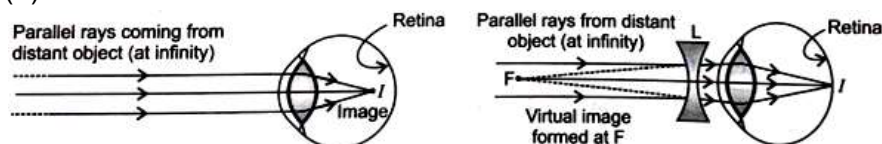
$$P = \frac{1}{f(m)} = \frac{1}{v} - \frac{1}{u}$$

$$= \frac{1}{-2} - \frac{1}{-\infty} \quad (v = -2 \text{ m}, u = -\infty)$$

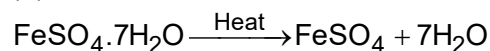
$$\Rightarrow P = -\frac{1}{2} = -0.5 \text{ D}$$

So, he should use concave lens of power -0.5D to see distant objects clearly.

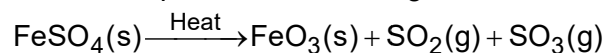
(d)



(a) When ferrous sulphate is heated, the green colour of crystals changes to white.

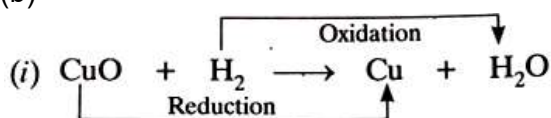


37. On further heating of ferrous sulphate, iron(III) oxide, sulphur dioxide and sulphur trioxide are formed. Sulphur dioxide is the gas that has a distinctive odour of burning sulphur.

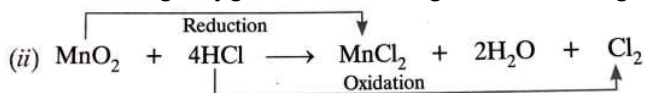


In this reaction, a single reactant (FeSO_4) breaks down in the presence of heat to give rise to simpler products. Thus this reaction is thermal decomposition.

(b)



CuO is losing oxygen and is being reduced. H_2 gains oxygen and gets oxidised.



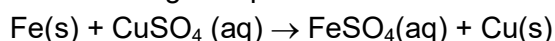
MnO_2 is reduced to MnCl_2 .

HCl is oxidised to Cl_2

OR

(c) Copper sulphate solution is blue in colour. When an iron nail is dipped in this solution, the colour of copper sulphate fades and a pale yellow solution is seen. This is due to displacement of copper from its solution by an iron nail to form iron(II) sulphate.

This is a single displacement reaction.



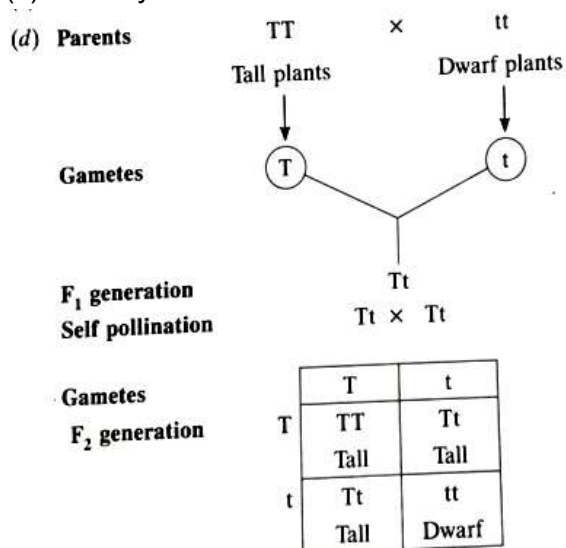
38. (a) Genotype of

(i) Parents $\text{TT} \times \text{tt}$
(ii) F_2 generation $\text{TT}, \text{Tt}, \text{tt}$

OR

- (b) Phenotypic ratio of F_1 generation - All round
 Genotypic ratio of F_1 generation - All R r
 Phenotypic ratio of F_2 generation - 3 round : 1 wrinkled
 Genotypic ratio of F_2 generation - 1 : 2 : 1
 RR : Rr : rr

(c) Monohybrid cross



39. (a) The direction of current is from right to left as electron beam enters from left to right and magnetic field is into the page.
 (b) It will be deflected in west direction.
 (c) As, the electron beam passes through magnetic field, the direction of deflection is determined by Fleming's left hand rule. According to Fleming's left hand rule, force is perpendicular to the flow of current.

OR

- (d) We conclude that a current carrying wire produces a magnetic field around it.

SOLUTIONS (Sample Paper – 5)

- | | |
|---------|---------|
| 1. (a) | 11. (c) |
| 2. (c) | 12. (a) |
| 3. (d) | 13. (b) |
| 4. (a) | 14. (c) |
| 5. (a) | 15. (c) |
| 6. (a) | 16. (c) |
| 7. (c) | 17. (b) |
| 8. (b) | 18. (b) |
| 9. (d) | 19. (d) |
| 10. (d) | 20. (a) |

21. Here, $Q = 500 \text{ C}$, $I = 25 \text{ mA} = 25 \times 10^{-3} \text{ A}$

$$t = ?$$

$$Q = It$$

$$\Rightarrow t = \frac{Q}{I} = \frac{500 \times 10^3}{25} = 20000 \text{ s}$$

22. An athlete suffers from cramps while running due to the accumulation of lactic acid in the muscles.

Differences :

Anaerobic respiration	Aerobic respiration
• It occurs in absence of oxygen.	• It occurs in presence of oxygen.
• End products formed are lactic acid and energy	• End products formed are carbon dioxide, water and energy.

OR

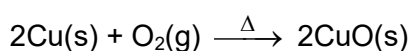
Lymph is also called tissue fluid/extra cellular fluid.

Functions :

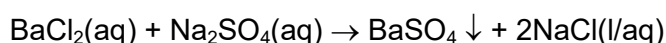
- (i) It carries digested and absorb fats from intestine.
- (ii) It drains excess fluid from extra-cellular space .

23. Copper oxide is formed.

It is black in colour.



OR



Ions precipitated : Ba^{2+} , SO_4^{2-}

24. (i) The intermolecular forces of attraction between the molecules of carbon compounds is weak and therefore, the melting and boiling points of carbon compounds are generally low.

(ii) Carbon compounds are covalent in nature and do not dissociate and form ions because of which they are poor conductor of electricity.

25. *Plasmodium* reproduces by multiple fission in which a single cell divides into many daughter cells simultaneously, inside a protective covering called cyst.

Leishmania reproduces by binary fission in which a parent cell divides into two nearly equal sized daughter individuals.

26. (a) Convex lens is converging lens. The sunlight is converged at a point by convex lens which generates heat causing the paper to burn.

(b) - Principal focus

- Real image of the sun

27.

Food chain	Food web
It is a series of organisms feeding on one another at various levels.	It is a network of interconnected food chains which provides a number of feeding connections amongst different organisms.

- Population of organisms of first trophic level (grass) will increase .
- Population of organisms of third trophic level (tiger) will decrease.

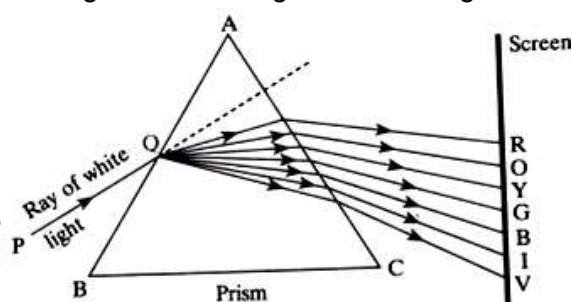
28. (a) The effect of vision depicted is hypermetropia or long-sightedness. Ciliary muscles or eye lens is responsible for this condition.
- (b) (i) Due to greater focal length of the eye lens.
(ii) Eyeball becomes smaller
- (c) Convex lens is used to correct this defect.

Convex lens provide the additional focusing power to the eye lens and shifts the image back onto the retina from beyond and the defect is corrected.

OR

The splitting of white light into its constituent colours is called dispersion.

Cause: Different colours of white light bend through different angles with respect to incident ray.



29. $\text{Fe(s)} + \text{CuSO}_4(\text{aq}) \rightarrow \text{FeSO}_4(\text{aq}) + \text{Cu(s)}$
Displacement reaction-A reaction in which a more reactive metal displaces a less reactive metal from its salt solution.

Zinc, Aluminium, Magnesium, Calcium

30. (a) - It gets magnetised
- Electromagnet
- It behaves as a magnet only when current passes through the solenoid.
- (b)

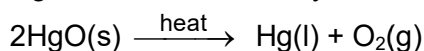


The pattern of magnetic field lines indicate that the magnetic field is uniform, inside a current carrying solenoid.

31. (a) - All tall
-Tt
- (b) The gene for shortness is a recessive trait. Recessive trait cannot be expressed in the presence of dominant trait (tallness).
- (c) 3 : 1
Tall Short

Conclusion : Tall trait is dominant and short trait is recessive.

32. Cinnabar is the ore of mercury. It is found in nature as sulphide ore (HgS).
Mercury is obtained by roasting cinnabar.
- $$2\text{HgS(s)} + 3\text{O}_2(\text{g}) \rightarrow 2\text{HgO(s)} + 2\text{SO}_2(\text{g})$$
- HgO formed is thermally unstable and gives mercury.

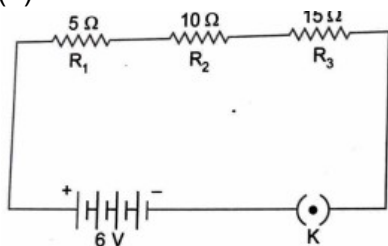


33. (a) Growth hormone secreted by pituitary gland. It stimulates growth in all organs.
- (b) Thyroxine hormone secreted by thyroid gland. It regulates carbohydrate, fat and proteins metabolism for body growth.

34. (a) Current will become one-third its initial value.

Ohm's Law-The potential difference across the ends of a conductor is directly proportional to the current flowing through it provided its temperature remains constant.

(b)



Total voltage, $V = 4 \times 1.5 \text{ V} = 6 \text{ V}$

Total resistance, $R = R_1 + R_2 + R_3$
 $= 5 + 10 + 15 = 30 \Omega$

(i) Current, $I = \frac{V}{R} = \frac{6}{30} = 0.2 \text{ A}$

(ii) Voltage, $V = IR = 0.2 \text{ A} \times 10 \Omega = 2 \text{ V}$

OR

(a) 1 volt is when 1 joule of work is done to move a charge of 1 coulomb from one point to the other.

(b) $d = 0.2 \text{ mm} = 2 \times 10^{-4} \text{ m}$ $R = 14 \Omega$

$$\rho = 1.6 \times 10^{-8} \Omega \text{ m}, A = \frac{\pi d^2}{4}$$

$$R = \frac{\rho l}{A} = \frac{4\rho l}{\pi d^2}$$

Or
$$I = \frac{\pi d^2 R}{4\rho} \Rightarrow I = \frac{22}{7} \times \frac{(2 \times 10^{-4})^2}{4 \times 1.6 \times 10^{-8}} \times 14$$

When the diameter is doubled

$$d' = 2d$$

then

$$A' = 4A$$

$$\frac{R'}{R} = \frac{A}{A'}$$

$$\frac{R'}{R} = \frac{A}{4A} \text{ or } \frac{R'}{14} = \frac{1}{4}$$

$$\Rightarrow R' = \frac{14}{4} = 3.5 \Omega$$

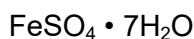
New resistance = $R - R' = 14 \Omega - 3.5 \Omega = 10.5 \Omega$

35. (a) The molecules of water of crystallisation in ferrous sulphate crystals get evaporated on heating. Those appear as tiny water droplets in the tube.

(b) Colour will change from

Green \rightarrow White

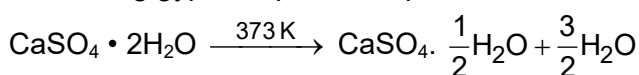
(c) Seven molecules of water of crystallisation



(i) $\text{CuSO}_4 \cdot 5\text{H}_2\text{O}$

(ii) $\text{Na}_2\text{CO}_3 \cdot 10\text{H}_2\text{O}$

(d) On heating gypsum, plaster of paris is obtained.



Uses of plaster of paris

- It is used for making toys

- It is used for supporting fractured bones.

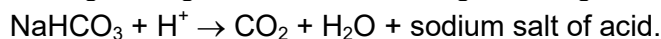
OR

- (a) 'X' - Tartaric acid
'Y' - Baking soda
'Z' - Baking powder
Chemical formula of
'Y' - NaHCO_3

- (b) Preparation of baking soda



Baking soda gives carbon dioxide gas during heating which makes the cake soft and spongy.



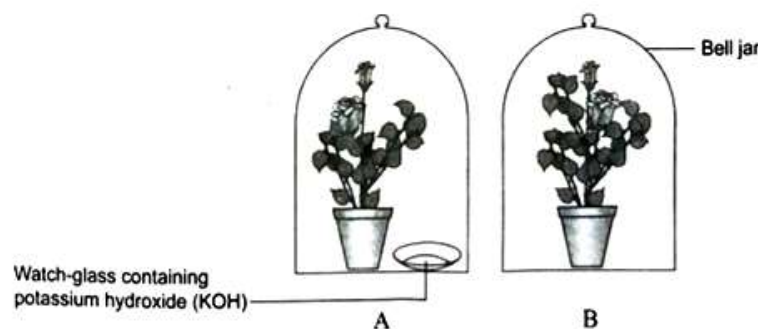
- (c) Magnesium hydroxide, $\text{Mg}(\text{OH})_2$

36. **Aim :** To show that carbon dioxide is necessary for photosynthesis.

Materials required : Two healthy potted plants of same size, two glass plates, two bell jars, vaseline, watch-glass, potassium hydroxide, alcohol, spirit lamp and beaker.

Procedure:

1. Keep the two potted plants in dark for three days so that the leaves become free from starch.
2. Place the potted plant A on a glass plate and put a watch-glass containing potassium hydroxide (KOH) by the side of the pot and cover it with a bell jar.
3. Place the other potted plant B on second glass plate and cover it with a bell jar.
4. Vaseline is used to seal the bottom of jars to the glass plates so that the set up is air-tight.
5. Both the plants are kept in sunlight for two hours.
6. Pluck a leaf from each plant and test the same for the presence of starch.



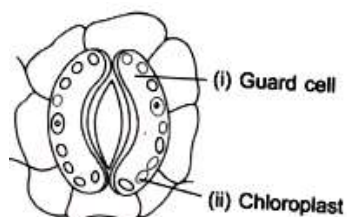
Observation : The leaf of plant B without potassium hydroxide turns blue-black while the leaf of plant A with potassium hydroxide remains pale coloured or colourless.

Conclusion: This shows that leaf of plant B has synthesised starch with the help of photosynthesis and leaf of plant A has not synthesised starch as it does not contain carbon dioxide as the same is absorbed by potassium hydroxide and photosynthesis did not occur. But plant B showed photosynthesis in presence of carbon dioxide. Therefore, carbon dioxide is necessary for photosynthesis.

OR

(a) In set-up (i) lime water turns milky in more time as compared to set-up (ii) because the air we exhale contains high percentage of CO_2 as compared to atmospheric air.

(b)



Functions of stomata

- Exchange of gases
- Transpiration.

37. (a)

Self-pollination	Cross-pollination
Transfer of pollen grains from anthers to the stigma of the same flower.	Transfer of pollen grains from the anthers of one flower to the stigma of another flower.

(b) Fertilisation is the union of male and female gamete to form a zygote.

Ovule - Seed

Ovary - Fruit

OR

(c) Future shoot- Plumule

Future .root-Radicle

Cotyledons are the embryonic leaves that store food for the germination of young plant.

38. (a) $u = -10$ cm, $f = +15$ cm, $v = ?$

Applying mirror formula

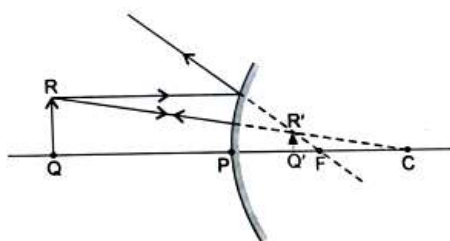
$$\frac{1}{f} = \frac{1}{v} + \frac{1}{u}$$

$$\frac{1}{v} = \frac{1}{f} - \frac{1}{u} = \frac{1}{15} + \frac{1}{10}$$

$$= \frac{2+3}{30} = \frac{5}{30}$$

$$\Rightarrow \frac{1}{v} = \frac{1}{6} \quad v = +6 \text{ cm}$$

(b) Convex mirror



(c) Principle axis is a straight line passing through the pole and centre of curvature of a concave mirror.

(d) After reflection, ray of light passes through the focus of the mirror.

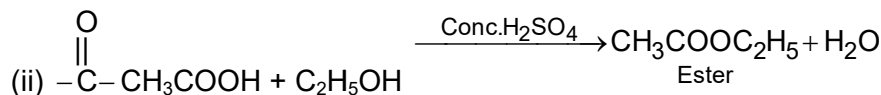
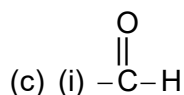
$$\therefore f = 10 \text{ cm}$$

$$R = 2f = 2 \times 10 = 20 \text{ cm}$$

39. (a) Compounds formed by carbon and hydrogen only are called hydrocarbons.

(b) - Tetravalency

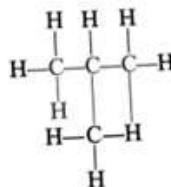
- Catenation



OR

(d) Structural isomers are compounds with identical molecular formula but different structures.

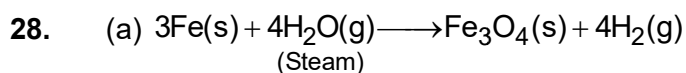
Two isomers of butane



When green plants are eaten by primary consumers, a great deal of energy is lost as heat to the environment, some amount goes into digestion and in doing work and the rest goes towards growth and reproduction. An average of 10% of the food eaten is made available for the next level of consumers. This loss of energy takes place at every trophic level.

(Alternatively accept: In accordance with 10% law of transfer of energy in a food chain only 10% of energy available at one trophic level is transferred to the next trophic level.)

27. (i) $\text{CH}_4(\text{g}) + 2\text{O}_2(\text{g}) \rightarrow \text{CO}_2(\text{g}) + 2\text{H}_2\text{O}(\text{l})$
 (ii) $\text{C}_2\text{H}_5\text{OH} \xrightarrow{\text{Hot Conc. H}_2\text{SO}_4} \text{CH}_2 = \text{CH}_2 + \text{H}_2\text{O}$
 (iii) $\text{CH}_3\text{COOH} + \text{NaOH} \rightarrow \text{CH}_3\text{COONa} + \text{H}_2\text{O}$



- (b) $\text{Ca}(\text{s}) + 2\text{H}_2\text{O}(\text{l}) \rightarrow \text{Ca}(\text{OH})_2(\text{aq}) + \text{H}_2(\text{g})$
 (c) $2\text{K}(\text{s}) + 2\text{H}_2\text{O}(\text{l}) \rightarrow 2\text{KOH}(\text{aq}) + \text{H}_2(\text{g}) + \text{heat}$

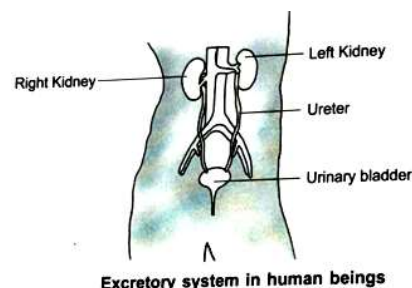
29. Blood pressure: It is the force that blood exerts against the wall of a vessel. This pressure is much greater in arteries than in veins.

It is measured by using an instrument called sphygmomanometer.

The pressure of blood inside artery during contraction or ventricular systole is called systolic pressure and pressure in artery during relaxation or ventricular diastolic pressure. The normal systolic pressure is about 120 mm of Hg and diastolic pressure is 80 mm of g.

OR

- (a) Excretion is the biological process of removal of harmful metabolic wastes from the body.
 (b) Nephrons.
 (c) (i) Kidney
 (ii) Ureter
 (iii) Urinary bladder



30. $m = \frac{-1}{5} = \frac{-u}{v} = \frac{-(-18)}{u}$
 $\Rightarrow u = -90 \text{ cm}$

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

$$\frac{1}{f} = \frac{1}{-18} + \frac{1}{-90}$$

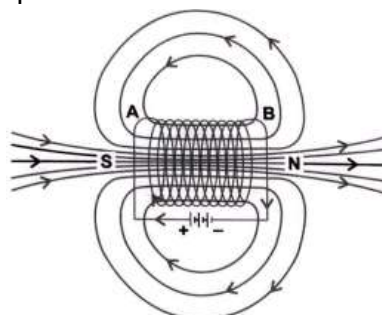
$\therefore f = -15 \text{ cm}$

Negative (-) sign indicates, it is concave mirror.

31. (a) Formation of rainbow
 (b) Atmospheric refraction
 (c) Red colour

32. Outside the solenoid magnetic field is minimum. At the ends of solenoid, magnetic field strength is half to that inside it. So

Minimum - at point B; Maximum - at point A



OR

(a) The forefinger indicates the direction of magnetic field, middle finger indicates the direction of electric current and thumb shows the direction of motion.

(b) The advantage of a solenoid over an ordinary coil is that inside a solenoid, a uniform magnetic field is produced.

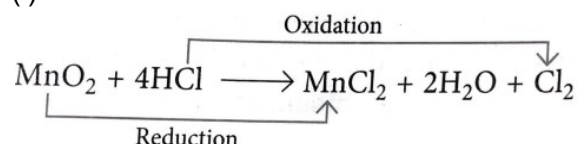
33. (a) • Changes in attitudes, which result into more use of disposable items like paper plates, plastic containers, etc.

• Changes in packaging, which result into more waste like plastic becoming non-biodegradable.

(b) Food chain

Grass → Rabbit → Snake → Hawk

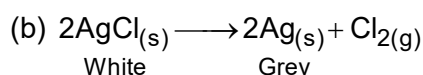
34. A. (i)



Oxidant: MnO_2

Reductant: HCl

(ii) (a) Slow oxidation of oils and fats present in food materials resulting in compounds with unpleasant smell is known as rancidity. Antioxidants are added to foods containing fats and oils to prevent the oxidation of fats and oils and thus increase the shelf life of food.

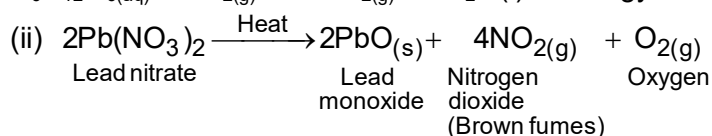


It undergoes photochemical decomposition reaction.

Silver chloride turns grey in sunlight to form silver metal.

OR

B. (i) The glucose produced in our body during digestion combines with oxygen in the cells of our body and provides energy. The special name of this reaction is respiration. Thus respiration is an exothermic process because energy is produced during this process.



Brown gas evolved is nitrogen dioxide (NO_2).

(iii) Chips manufacturers usually flush bags of chips with gas such as nitrogen because atmospheric oxygen can react with chips which may cause change in colour, change in taste. So to cut the contact between air and the chips, nitrogen gas is used which prevents the chips from getting oxidised.

35. A. (i) Given figure shows asexual reproduction by regeneration, the process in which small cut parts of body of an organism grow to form whole new organisms.

(ii) In the given figure, Planaria is shown.

(iii) Regeneration is a type of asexual reproduction. As only one parent is involved, the offspring produced is exactly similar to its parent.

(iv) **Features of regeneration:**

Regeneration is carried out by specialised cells which proliferate and make large numbers of cells. From this mass of cells, different cells undergo changes to become various cell types and tissues.

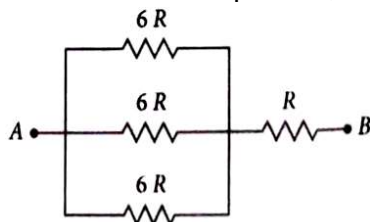
OR

B. (i) A is testis. It releases a male sex hormone called testosterone.

(ii) B is seminal vesicles and C is urethra. B pours its secretion along the path of sperm to provide nutrition and make transport easier. C is common passage for both sperms and urine.

- (iii) Sperms are produced by testes and are tiny bodies that consist of genetic material and a long tail that helps them to move towards female germ cell.
 (iv) Dis vas deferens which carries sperms from testes and transport them to ejaculatory duct.

36. A. (i) Here, three resistance each of value $6R$ are in parallel,



$$\frac{1}{R_p} = \frac{1}{6R} + \frac{1}{6R} + \frac{1}{6R} = \frac{1}{2R} \quad (\because R_p = 2R)$$

Total resistance between A and B = $2R + R = 3R$

(ii) Given resistance of wire, $R = 6\Omega$

Let l be the length of the wire and A be its area of cross-section. Then

$$R = \frac{\rho l}{A} = 6\Omega$$

Now when the length is doubled, $l' = 2l$

$$\text{and } A' = \frac{A}{2} \quad [\because Al = A'l']$$

$$\therefore R' = \frac{\rho(2l)}{A/2} = \frac{4\rho l}{A} = 4 \times 6\Omega = 24\Omega$$

(iii) Potential difference across lamp = $0.25 \times 18 = 4.5V$

(iv) Potential difference across resistor = $6 - 4.5V = 1.5V$

37. A. When Ag is added to $FeSO_4$ solution, no reaction will take place since Fe is more reactive than Ag.

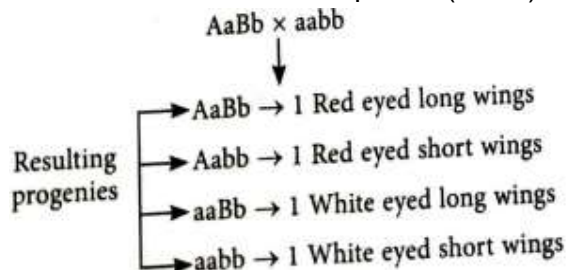
When Zn is added to $FeSO_4$ solution, the green solution of $FeSO_4$ becomes colourless due to formation of $ZnSO_4$ since Zn is more reactive than Fe.

- B. (i) Sodium (Na) and potassium (K).
 (ii) Copper (Cu)

OR

- C. (i) Zinc is more reactive as compared to tin and can react with the food items inside the can.
 (ii) Fe, being more reactive than Cu, displaces Cu from $CuSO_4$ solution. Cu gets deposited over the iron nail in the form of reddish-brown coating.

38. A. Test cross between the parent ($AaBb$) and recessive individual ($aabb$) is as follows:



2 out of 4 progenies would have short wings.

OR

- B. The progenies with red eyes and long wings will have the genotypes $AABB$, $AABb$, $AaBB$ and $AaBb$. Thus, out of 16 progenies, 9 would have red eyes and long wings.
 C. The total number of progenies with a recombinant phenotypes, i.e., red eyes with short wings and white eyes long wings are 6 out of 16.

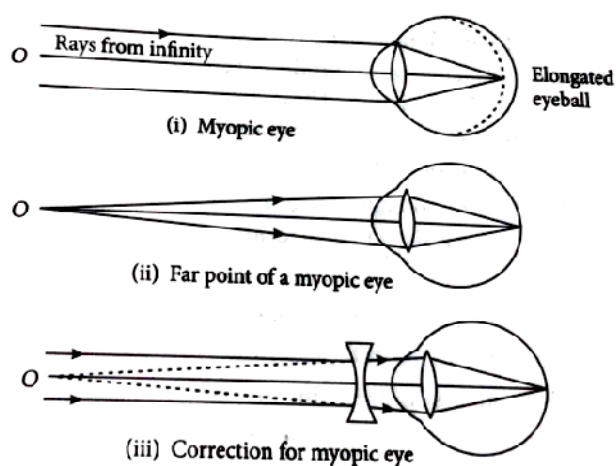
D. Phenotypes of F₂ generation obtained by self crossing F₁ generation of the given cross can be represented as follows :

	AB	Ab	aB	ab
AB	AABB Red eyes, Long wings	AABb Red eyes, Long wings	AaBB Red eyes, Long wings	AaBb Red eyes, Long wings
Ab	AABb Red eyes, Long wings	AAbb Red eyes, Long wings	AaBb Red eyes, Long wings	Aabb Red eyes, Short wings
aB	AaBB Red eyes, Long wings	AaBb Red eyes, Long wings	aaBB White eyes, Long wings	aaBb White eyes, Long wings
ab	AaBb Red eyes, Long wings	Aabb Red eyes, Short wings	aabb White eyes, Short wings	

39. A. Akshay is suffering from myopia or near-sightedness.
 B. He should use concave lens to correct this defect.
 C. The two possible causes of this defect are :
 (i) Increase in the length of the eye ball, as if distance of retina from the eye lens has increased
 (ii) Excessive curvature of the eye lens.

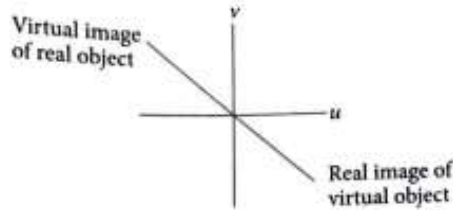
OR

D.

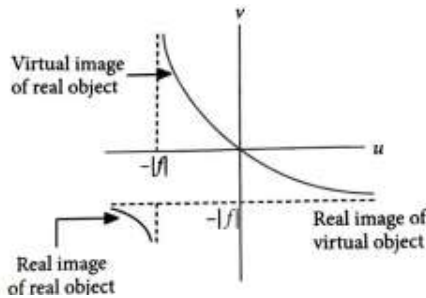


SOLUTIONS (Sample Paper – 7)

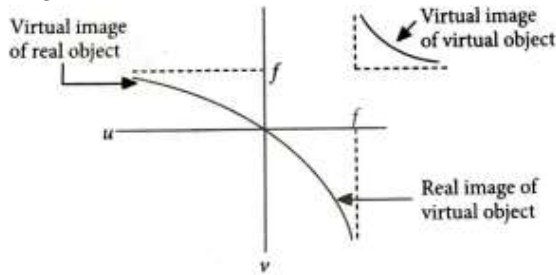
1. (d) A person suffering from cataract has cloudy opaque eye-lens.
2. (a) v-u graph for plane mirror



Thus, plane mirror forms virtual image of real object and real image of virtual object.
v-u graph for concave mirror.

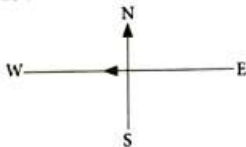


Thus, concave mirror never forms virtual image of virtual object.
v-u graph for convex mirror.



Thus, convex mirror never forms real image of real object.

3. (a) According to right hand thumb rule, the point is at the direction above the wire.



4. (d) Potential difference = $\frac{\text{Work done}}{\text{charge}}$

$$\therefore \text{Work done} = 3V \times 4 \text{ C} = 12 \text{ J}$$

5. (b) As refractive index of a medium increases, more bending of light takes place. For A – B, ratio of refractive indices of A and B is least, so least bending of light takes place for this pair of media.

Air

Medium A
$\mu_A = 1.50$

Medium B
$\mu_B = 1.33$

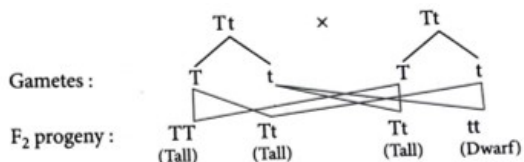
Medium C
$\mu_C = 2.42$

Air

6. (d) A freely suspended magnet always rest in north-south direction because the north-pole of the magnet lies in the geographic north direction and the south pole of the magnet lies in the geographic south direction.

7. (b) Vena cava carries deoxygenated blood from various body parts to right atrium.
8. (a) Reflex arcs are more efficient for quick responses because they do not involve thinking.
9. (d) Regeneration and fragmentation is the ability of an organisms from their body parts, e.g., Hydra and *Planaria*, reproduce by regeneration while *Spirogyra* multiple through fragmentation.
10. (a) When F₁ progeny (Tt) are crossed, one quarter of F₂ will be short (tt).

F₁ generation selfing :

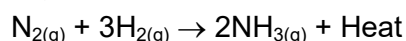


Phenotypic ratio : 3(tall) : 1 (dwarf)

Genotypic ration : 1(TT) : 2 (Tt) : 1(tt)

Thus, genotypic ratio of different traits that would result in F₂ generation will be 1:2:1.

11. (a)
12. (a) Crop field is an example of man made ecosystem.
13. (d) Atom X has one valence electron while atom Y has 6 valence electrons. In order to complete their outermost shells, two X atoms lose one electron each and these two electrons are gained by atom Y, forming an ionic compound of formula compound of formula X₂Y.
14. (d)
15. (b) Copper is more reactive than silver and displaces silver from its salt solution.
16. (b)
17. (b) Heating element of the heater wire must have high resistance than connecting wires so that most of the potential drops across the heater wire. Because in series connecting more the resistance, more will be the potential difference. Obviously, it should have high melting point.
18. (b) As we increase the current in the wire, the magnetic field will increases near the conductor or current carrying wire. Therefore, the deflection of compass needle increase.
19. (b) In the reaction, bonds between atoms of nitrogen molecule and atoms of hydrogen molecule are broken and new bonds are formed to produce ammonia. Heat energy is liberated to the surroundings. Hence, this reaction is exothermic.



20. (b)
21. The urinary bladder is a muscular structure, it is under the control of nervous system. Hence, the urge to urinate can be controlled to some extent.

22.

S.No.	Types of Organism	Excretory Organ	Mode of Excretion
1.	Unicellular organisms	Body surface	Diffusion into surrounding water through general body surface.
2.	Multicellular plants	Stomata	Get rid of excess water by transpiration and oxygen produced by photosynthesis is used in respiration.
3.	Multicellular animals	Flame cells (Planaria), nephridia (earthworm), Malpighian tubules (cockroach), kidney (human being)	Excrete nitrogenous wastes such as urea, ammonia and uric acid through specialised excretory organ.

23. A. In humans, sex of a baby is determined at the time of fertilisation. When the sperm carrying X chromosome fertilises an egg, the zygote develops into female (XX condition) and when a sperm carrying Y chromosome fertilises an egg, the zygote develops into male (XYcondition).

OR

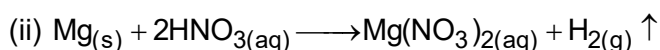
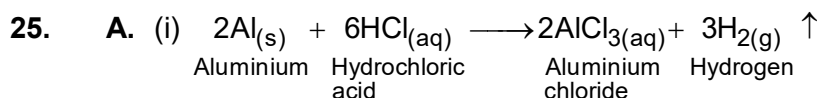
B. (i) Genes : Segments of DNA having specific sequence of nucleotides that determines its specific biological function.

(ii) Heredity : The inheritance of characters from the parents to the offspring is called heredity.

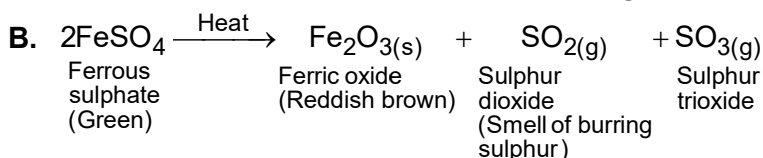
(iii) Trait : The character or feature that is carried by a gene is called a trait, e.g., height of plant.

(iv) Variations : The differences existing among the individuals of a species and also among the offspring of the same parents are called variations.

24. The roots of plants show positive geotropism due to differential growth caused by unequal distribution of auxins (plant hormone). Phototropism is the movement of a part of the plant in response to light. Shoots generally grow towards light and are said to be positively phototropic, while roots grow away from light and are said to be negatively phototropic. The phytohormone, auxin controls it.



OR



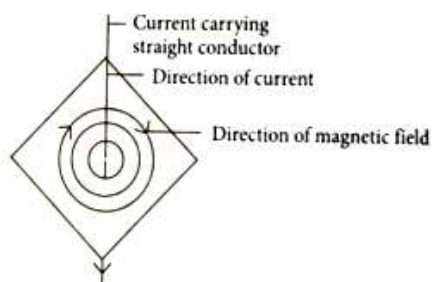
Green coloured ferrous sulphate decomposes to reddish brown ferric oxide.

(ii) Colourless gas with choking smell is evolved.

26. Different types of mirrors produce different types of images;
 Concave mirror produces an enlarged image when the object is placed near it.
 Convex mirror produces a smaller image when the object placed near it.

27. A. On passing current, the rod gets displaced because a magnetic force exerted on the rod when it is placed the magnetic field. Fleming's left hand rule is used to determine the direction of magnetic force exerted on the conductor AB.

B.



The rod will be displaced towards left according to Fleming's left-hand rule.

28. A. (i) (5): Given, length of the rod AB= 10 cm.

Focal length, $f = PF = 10 \text{ cm}$

Radius of curvature, $R = PC = 2f = 20 \text{ cm}$

Also, $PB = 20 \text{ cm}$

Now, it is clear from the figure A the end B of the rod AB lies at the centre of curvature of the mirror. So, the image of B will be formed at B'. Obviously, the points, B, B' and Care the same point.

Now, for the end A,

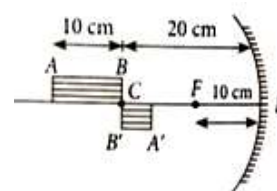
Object distance, $u = -30 \text{ cm}$

Focal length, $f = -10 \text{ cm}$

Applying mirror equation, we get

$$\frac{1}{v} + \frac{1}{u} = \frac{1}{f} \text{ or } \frac{1}{v} = \frac{1}{f} - \frac{1}{u} = \frac{1}{-10} - \frac{1}{-30} = -\frac{1}{15}$$

$$\therefore v = -15 \text{ cm}$$



So, if A' be the position of the image of the end A, PA' = 15 cm

Hence the size of the image = A' B' = 20 - 15 = 5 cm.

(ii) 60°

(iii) As we know, $m = -\frac{u}{v} = -\frac{15}{30}$ $m = -\frac{1}{2}$

OR

B. (i) Refraction of light takes place due to change in the speed of light as it enters from one medium to another medium.

(ii) A water is rarer than glass, so when a ray of light travels from rarer medium to denser medium, the ray bends towards the normal.

(iii) Given $\mu_w = \frac{4}{3}, \mu_g = \frac{3}{2}$

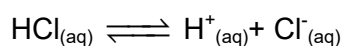
$$v_g = 2 \times 10^8 \text{ m/s}$$

$$\mu_g = \frac{c}{v_g} \Rightarrow c = \frac{3}{2} \times 2 \times 10^8 \text{ m/s}; \quad c = 3 \times 10^8 \text{ m/s}$$

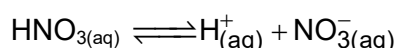
$$v_w = \frac{3 \times 10^8 \times 3}{4} = 2.25 \times 10^8 \text{ m/s}$$

29. The given substances dissociates to produce ions in their solutions as follows :

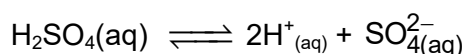
(i) Hydrochloric acid (HCl)



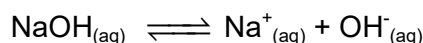
(ii) Nitric acid (HNO₃)



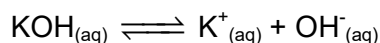
(iii) Sulphuric acid (H₂SO₄)



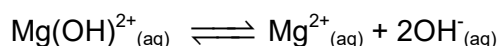
(iv) Sodium hydroxide (NaOH)



(v) Potassium hydroxide (KOH)



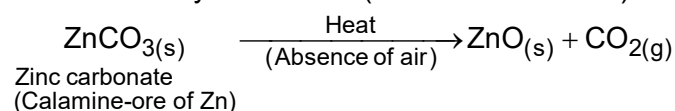
(vi) Magnesium hydroxide [Mg(OH)₂]



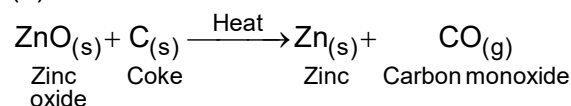
30. The ore on treatment with dilute hydrochloric acid produces brisk effervescence hence, it must be a carbonate ore. Calamine (ZnCO₃) is an important carbonate ore of zinc. Reactions involved are :

(a) Conversion of the carbonate ore into metal oxide

This is done by calcination (For carbonate ores).



(b) Reduction of the metal oxide to metal :



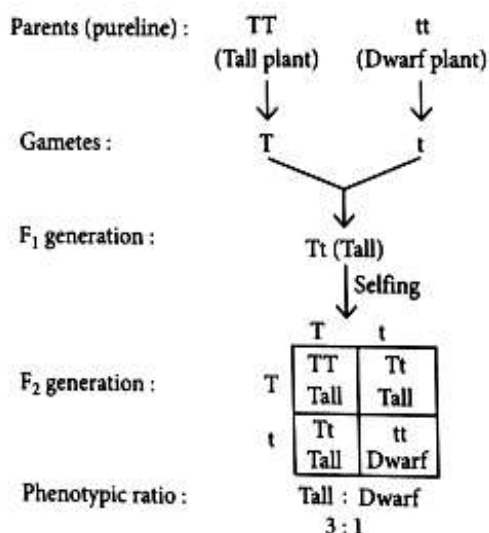
The reduction of metal oxides by heating with coke is called smelting.

31. (i) Decomposition reaction. Carbohydrates are broken down to form glucose. A reaction in which a single reactant breaks down to form two or more products is known as decomposition reaction.

(ii) Oxidation reaction. When an iron object is left in moist for a considerable amount of time, it gets covered with reddish-brown flaky substance called rust. An oxidation reaction is defined as a reaction that involves addition of oxygen or loss of hydrogen.

(iii) Displacement reaction. More reactive metal, aluminium displaces less reactive metal, manganese to form salt solution. The chemical reaction in which one element place of another element present in a compound is called displacement reaction.

32. A. Mendel first selected two pureline plants having contrasting characters. He then crossed such plants. In the F_1 generation, he observed that only one of the two contrasting characters appeared, he called it dominant and the one which does not get expressed in F_1 was recessive. He later selfed the F_1 plants and observed that both the traits appear but in a definite proportion. It can be explained by following cross :



This is how Mendel explained that a trait is inherited but expressed in the plant.

B. Both TT and Tt are tall plants, while only tt is a short plant. In other words, a single copy of 'T' is enough to make plant tall, while both copies have to be 'f for plant to be short. Thus, 'T' is dominant trait and 'f is recessive trait.

33. A. A terrestrial food chain with four trophic levels is :
Grass → Insect → Frog → Eagle

B. Removal of the organisms of any trophic level will always adversely affect the ecosystem, e.g., the removal of lions and tigers (top carnivores) will cause rapid increase m deer population (herbivore), which leads to rapid consumption of vegetation resulting in scarcity of vegetation and eventually population crash of deer.

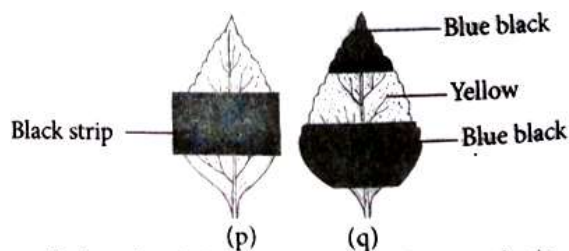
C. According to ten percent law, only 10% of the energy is received by the next trophic level. If the energy available at second trophic level (T_2) is 2000 J, then the 20 J of energy will be at fourth trophic level (T_4).

Producers → Primary → Secondary → Tertiary

	consumer	consumer	consumer
T_1	T_2	T_3	T_4
20,000 J	2000 J	200 J	20 J

34. A. (i) Experiment which demonstrates that light is necessary for photosynthesis is as follows :
1. Take a potted plant and keep it in dark for about 36 hours to destarch the leaves. Cover a part of leaf with black strips on both the surfaces as shown in figure (p).
 2. Now place the plant in sunlight for 6 hours.
 3. Pluck the leaf, remove the strip and test the leaf for starch.
 4. On applying iodine, the part which was covered by black strip remains yellow while the sunlight exposed part becomes blue black.

This shows that only part which was exposed to light can synthesis food. Hence, we can conclude that light is necessary for photosynthesis.



To show that light is necessary for photosynthesis:
 (p) destarched leaf covered with black strip (q) covered portion does not turn blue black while tested with iodine

- (ii) Due to blockage of stomata, the plant will not remain healthy for long. This is because of the following reasons :
1. Gaseous exchange takes place through stomata. On applying coating of vaseline, stomata get blocked. This will lead to failure of gaseous exchange. As a result, plant will not be able to respire. This will lead to death of the plant.
 2. Because of the blocked stomata, plant will not be able to take carbon dioxide and thus, incapable to perform photosynthesis. Because of this plant will not remain healthy.
 3. Transpiration also takes place through stomata. If stomata are blocked, transpiration will be affected which in turn affect the absorption and transport of water by the plant.
- (iii) If two green plants are kept separately in oxygen free containers, one in the dark and the other in continuous light, the later will live longer because it will perform photosynthesis. During photosynthesis, O_2 will be released which will be utilised by the plant for respiration.

OR

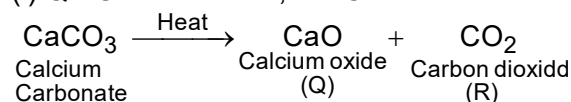
B. (i) Functions of blood are as follows:

- (a) Plasma transports food, carbon dioxide and nitrogenous wastes in dissolved form.
- (b) Red blood cells carry oxygen to each and every cell.
- (c) White blood cells act as soldiers of our body and kill germs.
- (d) Platelets help in blood clotting, plugs the leakage.
- (e) Blood maintains our body temperature.

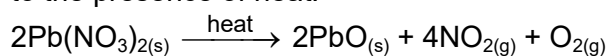
(ii) Fishes have only two chambers in their heart, the blood is pumped to the gills to get oxygenated blood and from there it passes directly to rest of the body. Thus, the blood goes only once through the heart during one cycle of passage through the body. This type of circulation is termed as single circulation.

(iii) Dental caries is the tooth decay that causes gradual softening of enamel and dentine. It is caused when bacteria softening of enamel and dentine. It is caused when bacteria act on sugars and produce acids that softens or demineralises the enamel. It happens when masses of bacterial cells (*Streptococcus mutans*) together with food particles stick to the teeth to form dental plaque. As plaque cover the teeth, saliva cannot reach the teeth surface to neutralise the acid. Brushing the teeth after eating removes the plaque before the bacteria produces acids.

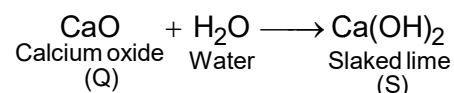
35. A. (i) Q - Calcium oxide; R - Carbon dioxide



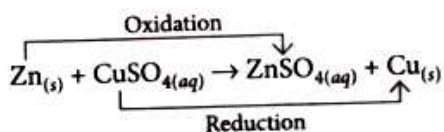
(ii) Thermal decomposition. The compound was broken down into two simpler substances due to the presence of heat.



(iii) The solution (S) is slaked lime.

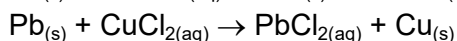
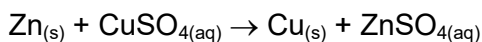


- B. (i) P = Zn, Q = Cu
(ii) The substance that oxidises another substance is called an oxidising agent. While the substance which reduces others is called reducing agent.



So in this reaction, CuSO_4 is the oxidising agent and Zn is the reducing agent.

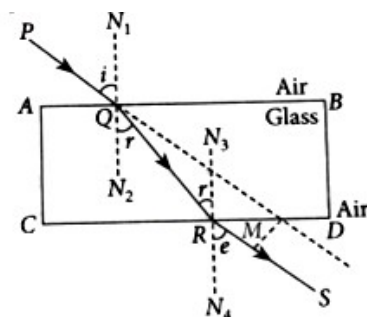
(iii) It is a displacement reaction as more reactive metal zinc displaces less reactive copper metal from its salt solution.



36. A. (i) Speed of light is inversely proportional to its refractive index.
(ii) According to Snell's law of refraction, the product of refractive index of sine of angle of incidence at a point in a medium is constant. It implies that when light travels from medium 1 to

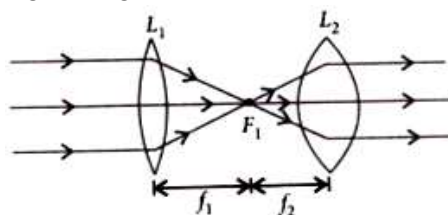
medium 2, then $n_1 \sin i = n_2 \sin r$ $\frac{\sin i}{\sin r} = \frac{n_2}{n_1} = \mu_{21}$

(iii)



OR

- B. (i) The optical device is a convex lens as rays are converging after passing through it.
(ii) Suppose we have two converging lens of focal lengths f_1 and f_2 . We will keep the two converging lens at a distance of $f_1 + f_2$ so that a parallel beam of light entering one lens emerges as parallel beam after passing through the second lens.



Here the focus of the two lenses should coincide.

(iii) Focal length of concave lens, $f = -12$ cm

Object distance, $u : -3$ cm

image distance, $v : ?$

Using lens formula, $\frac{1}{f} = \frac{1}{v} - \frac{1}{u}$ or $\frac{1}{v} = \frac{1}{f} + \frac{1}{u}$

So, $v = \frac{12}{-5} = -2.4$ cm

So, the image is formed at 2.4 cm from the concave lens.

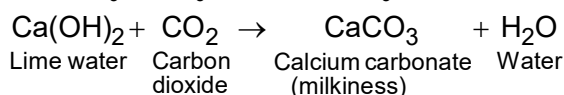
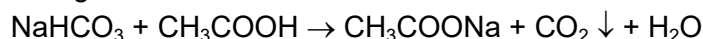
(iv) Using magnification formula, $\frac{v}{u} = \frac{-2.4}{-3} = +0.8$

37. **A.** The branch of renal vein carries blood to glomerulus (2). In glomerulus, the blood is filtered through tiny slits and enters the tubular part of nephron.
B. The blood is filtered and enters the tubular part of nephron (3) and after more filtration and reabsorption, it enters the collecting duct (4) from where it enters the urinary bladder through ureters.

OR

- C.** Malpighian corpuscle (1 + 2) is the site of ultrafiltration.
 A considerable amount of water is reabsorbed in the collecting duct (4) to produce a concentrated urine.

38. **A.** When sodium hydrogen carbonate is added to acetic acid, carbon dioxide gas is evolved. CO₂ gas can be confirmed by passing the gas through lime water. Lime water turns milky, thus CO₂ gas is confirmed.



- B.** Sodium hydrogen carbonate is soluble in water. It turns red litmus blue.

OR

- C.** (i) Sodium hydrogen carbonate is an ingredient used for making baking powder.
 (ii) It is used in fire extinguishers.

39. **A.** Least distance of human eye is 25 cm.

- B.** As the student cannot read the letters written in his textbook, the near point of his eyes has receded away.

- C.** The person near point is 75 cm, i.e., he could see object near than 75 cm. Near point of normal eye = 25 cm

Object distance, $u = -25 \text{ cm} = -0.25 \text{ m}$

Image distance, $v = -75 \text{ cm} = -0.75 \text{ m}$

Using formula,

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

$$\frac{1}{f} = \frac{1}{-75} - \frac{1}{-25} = \frac{2}{75}$$

$$\Rightarrow f = \frac{75}{2} = 37.5 \text{ cm}$$

OR

- D.** The corrective lens should form the image of the far off object at the far point of the myopic person. So, by using the lens formula, we can write

$$\frac{1}{f} = \frac{1}{v} - \frac{1}{u} = \frac{1}{-1.2\text{m}} - \frac{1}{\infty} = -\frac{1}{1.2\text{m}}$$

or, $f = -1.2 \text{ m}$

So, power of the lens,

$$P = -\frac{1}{1.2} \text{ D} = -0.83 \text{ D}.$$

SOLUTIONS (Sample Paper – 8)

1. (b)
2. (a)
3. (b) Acids turn blue litmus red. liberate hydrogen gas on reaction with zinc and evolve carbon dioxide gas with metal carbonates. Bases turn red litmus blue, evolve hydrogen gas with zinc and do not react with metal carbonates.
4. (d) $2\text{KClO}_{3(s)} \xrightarrow{\text{Heat}} 2\text{KCl}_{(s)} + 3\text{O}_{2(g)}$
5. (c)
6. (a) Zinc rod dipped in blue copper sulphate solution is oxidised to Zn^{2+} and Cu^{2+} are reduced to Cu and get deposited on zinc rod.
7. (c)
8. (b)
9. (d) Both auxin and gibberellin help in growth of stem.
10. (c)
11. (b) In first generation all plants will have one dominant allele and one recessive allele. Presence of dominant allele in all progenies will produce all red flowered plants in F_1 generation.
12. (c) The blood urea level rises abnormally (uremia) in patients suffering from renal failures. An artificial kidney is used for removing excess urea from the blood of the patient by a process called haemodialysis.
13. (a)
14. (d) The inverse of the slope of I-V graph gives the resistance of the material. Here, the slope of R_3 is highest. Thus, $R_2 > R_1 > R_3$.
15. (d) In a food chain, there is always a unidirectional flow of energy. Energy flows from producers to consumers and never comes back to producers.
16. (b) Chlorofluorocarbons (CFCs) is the major ozone depleting substance which produce "active chlorine, in the presence of UV radiation. These active chlorine radicals catalytically destroy ozone and convert it into oxygen. This leads to thinning of ozone layer.
17. (d) Bronze contains Sn (10%), Cu (80%) and Zn (10%). Bronze is resistant to corrosion.
18. (a)
19. (c) Astigmatism occurs when the cornea or the eye lens or both are not perfectly spherical.
20. (c) Ozone is present in the stratosphere of the atmosphere. It is formed by photochemical reactions. The UV radiations split some molecular oxygen (O_2) apart into free oxygen atom ($\text{O}+\text{O}$). These atoms then combine with molecular oxygen to form ozone.
21. A. When barium hydroxide is added to ammonium chloride, the bottom of test tube is found to be cooler.
B. It is an endothermic reaction.
C. $\text{Ba}(\text{OH})_2 + 2\text{NH}_4\text{Cl} \longrightarrow \text{BaCl}_2 + 2\text{NH}_4\text{OH}$

22.

S.No	Basis of difference	Ovule	Ovary
1.	Location	Ovule is present inside the ovary.	Ovary is main female reproductive organ forming the swollen base of a flower.
2.	Post-fertilisation development	Ovule develops into a seed.	Ovary ripens into a fruit

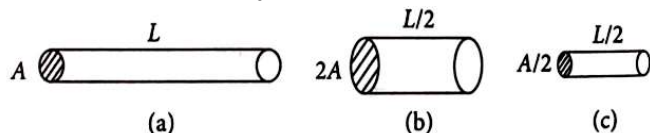
23. A. Nutrition in both Amoeba and Paramecium is holozoic. However, Amoeba takes in food using temporary finger-like extensions of the cell surface which fuse over the food particle forming a food vacuole. Inside the food vacuole, complex substances are broken down into simpler ones which then diffuse into the cytoplasm. The remaining undigested material is moved to the surface of the cell and thrown out whereas in Paramecium, the cell has a definite shape and

food is taken in at a specific spot. Food is moved to this spot by the movement of cilia which cover the entire surface of the cell.

OR

- B. (i) Both arteries and veins carry blood.
 (ii) Both xylem and phloem are conducting tissues in plants.
 (iii) Blood and lymph are fluid connective tissues.

24. A. We have three cylindrical conductors a, b and c –



These three conductors are made of the same materials and their respective resistance are σR_A , R_B and R_C .

$$\therefore R = \frac{\rho L}{A}. \text{ So, } R_a = \frac{\rho \times L}{A} = \frac{\rho L}{A}$$

$$R_b = \frac{\rho \times L / 2}{2A} \Rightarrow \frac{\rho L}{4A}, R_c = \frac{\rho \times L}{\frac{A}{2} \times 2} \Rightarrow \frac{\rho L}{A}$$

$$\frac{R_a}{R_c} = \frac{\rho L}{R_c} / \frac{\rho L}{A} \Rightarrow 4; \frac{R_a}{R_b} = 4.$$

B. $\frac{R_a}{R_c} = \frac{\rho L}{R_c} / \frac{\rho L}{A} \Rightarrow 1$

- C. Resistivity of alloys is generally higher than its constituent metals. Therefore, constantan has more resistance.

25. A. (i) Concave mirror

(ii) Magnification, $m = -\frac{u}{v}$ or $v = u$

\therefore Distance of the image from the object is, $v - u = 0$
 As the image is formed at centre of curvature i.e., $v = R$.

\therefore focal length of the mirror, $f = \frac{-50}{2} = -25\text{cm}$

OR

- B. Focal length of a mirror is given by

$$\text{Focal length} = \frac{\text{Radius of curvature}}{2}$$

Since, both the mirrors have same radius of curvature, therefore focal length of the two mirrors will

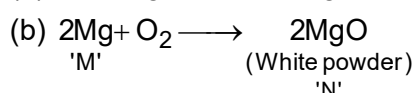
be same, i.e., $\frac{f_1}{f_2} = \frac{1}{1}$

Since virtual image is always formed by convex mirror, the mirror AB will always form virtual image. Virtual images cannot be obtained on screen.

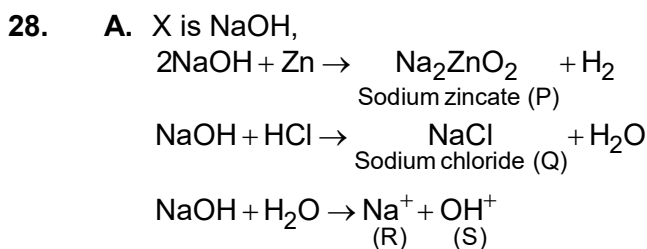
26. Producers are organisms which synthesise their own food by the process of photosynthesis, such as plants. If we remove producer from a balanced food chain, then :

- The availability of food in a food chain will become a major concern.
- Producers utilise minerals released in nature and in absence of producers, nutrient cycle will get disturbed.

27. (a) 'M' is Mg and 'N' is MgO.



- (c) 'M' undergoes oxidation in this reaction because Mg gains oxygen to form MgO.

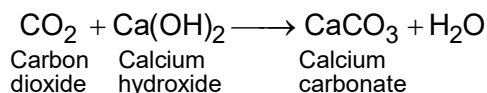


OR

B. (a) Egg shell contains calcium carbonate. When nitric acid is added to egg shell it is dissolved in the acid giving out carbon dioxide gas.



(b) Oxides of non-metals react with bases to form salt and water. For example : Calcium hydroxide, which is a base, reacts with carbon dioxide to produce salt and water.



Hence, oxides of non-metals are generally acidic in nature.

29. The blood urea level rises abnormally (uremia) in patients suffering from renal failure. In uremic patients, artificial kidney is used for removing accumulated waste products like urea from the blood by a process called haemodialysis. During the process, the patient's blood is made to pass through the dialysis machine which filters the waste material from blood and the blood is again transfused into the patient's body. Dialysis work exactly on principle of kidney. Haemodialysis performed twice thrice a week can save and prolong the life of uremic patients.

30. A. Sameer is suffering from diabetes mellitus. It is a metabolic disorder with elevated blood glucose level. Insulin is responsible for maintaining blood sugar level. It is secreted by beta cells of pancreas.

B. Cytokinin induces the rapid cell division in plants.

Absciscic acid is called stress hormone and inhibits growth induce dormancy.

31. A. The pole strength of bar magnet = 10 Am

Since, if bar magnet is cut into equal parts breadthwise then pole strength of each magnets will always remain same. 10 Am.

B. (i) When current flows from east to west direction, magnetic field below it is from north to south direction according to right-hand thumb rule.

(ii) For straight current carrying wire, thumb represents direction of current and curl of fingers give the direction of magnetic field whereas in case of circular current carrying wire, the curl of fingers represents the direction of current thumb represents the direction of magnetic field at the centre of the coil.

(iii) From right hand thumb rule, magnetic field is 90° to the plane of wire.

32. A. In the given problem object distance, $u = -12$ cm (by using sign convention). The focal length of the convex mirror, $f = 10$ cm.

From mirror formula,

$$\frac{1}{f} = \frac{1}{u} + \frac{1}{v}; \frac{1}{10} = \frac{1}{-12} + \frac{1}{v} \therefore \frac{1}{v} = \frac{1}{10} + \frac{1}{12}$$

$$\frac{1}{v} = \frac{12+10}{120}; \frac{1}{v} = \frac{22}{120}; v = \frac{120}{22} = 5.45 \text{ cm}$$

The image distance is 5.45 cm.

B. Given, ${}_a n_g = \frac{3}{2}$, ${}_a n_w = \frac{4}{3}$

Speed of light in glass, $v = 2 \times 10^8$ m/s

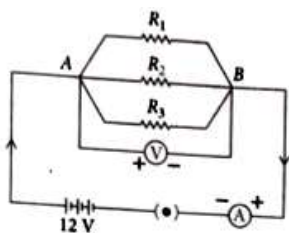
We know, ${}_a n_g = \frac{\text{speed of light in air}}{\text{speed of light in medium}}$

$$\Rightarrow \frac{3}{2} = \frac{c}{2 \times 10^8} \Rightarrow c = 3 \times 10^8 \text{ m/s}$$

Now, ${}_a n_w = \frac{\text{speed of light in air}}{\text{speed of light in water}} \Rightarrow \frac{4}{3b} = \frac{3 \times 10^8}{v}$

$$\Rightarrow v = \frac{9}{4} \times 10^8 \text{ m/s} = 2.25 \times 10^8 \text{ m/s}$$

33.



Here, $R_1 = 10\Omega$, $R_2 = 20\Omega$
 $R_3 = 30\Omega$ and $V = 12V$

A. Current through R_1 , $I_1 = \frac{V}{R_1} = \frac{12}{10} = 1.2 \text{ A}$

Current through R_2 , $I_2 = \frac{V}{R_2} = \frac{12}{20} = 0.6 \text{ A}$

Current through R_3 , $I_3 = \frac{V}{R_3} = \frac{12}{30} = 0.4 \text{ A}$

B. Total circuit resistance

$$\frac{1}{R} = \frac{1}{R_1} + \frac{1}{R_2} + \frac{1}{R_3} \quad (\because \text{they are in parallel})$$

$$= \frac{1}{10} + \frac{1}{20} + \frac{1}{30} = \frac{11}{60}$$

$$R = \frac{60}{11} \Omega = 5.45 \Omega$$

C. Total current, $I = \frac{V}{R} = \frac{12}{5.45} = 2.21 \text{ A}$.

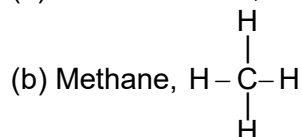
34. A. (a) The tests may be tabulated as below:

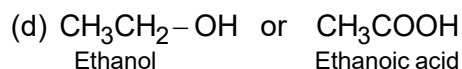
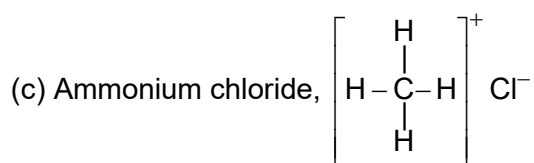
S.No	Solution	Blue litmus paper	Red litmus paper	Sodium Metal
1.	Ethanol	No change	No change	Hydrogen gas
2.	Ethanoic acid	Turns red	No change	Hydrogen gas
3.	Soap solution	No change	Turns blue	No reaction

(b) Hard water contains hydrogen carbonates, chlorides and sulphates of calcium and magnesium. When soap is added to hard water it reacts with these salts to form scum which is insoluble in water and floats on the top of the water surface. The scum is formed due to the formation of insoluble calcium or magnesium salts of fatty acids.

OR

B. (a) Carbon dioxide, $\text{:}\ddot{\text{O}}=\text{C}=\ddot{\text{O}}\text{:}$





(e) Unsaturated compounds burn with a sooty flame, for example, ethene, ethyne, etc.

35. A. (i) The corolla or petal (2) is brightly coloured part of a flower which attracts insects and help in cross pollination.
 (ii) Gardeners either remove part 3 (anther) or cover the 4 (stigma) to prevent self-pollination and ultimately carry out cross-pollination to bring more variation. This action results in better sapling in next generation.
 (iii) The flower given in a picture is a bisexual flower, it generally shows sexual reproduction with self-fertilisation.
 (iv) The ovule (6) of flower develops into seed after fertilisation. These seeds germinate and give rise to baby plants which grow and become a crop.

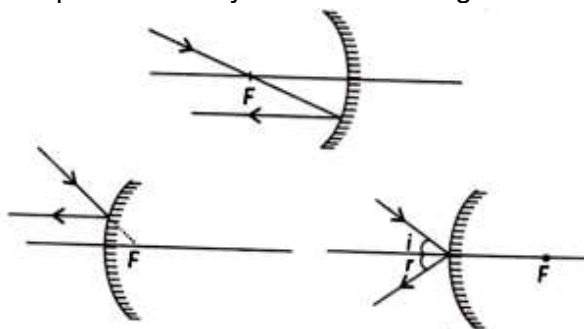
OR

- B. (i) Condoms are the example of mechanical barrier.
 (ii) Pills acts as a method of contraception by changing the hormonal balance of the body so that eggs are not released fertilization cannot occurs.
 (iii) In females fallopian tube is blocked due to which egg is blocked due to which sperm transfer is prevented
 (iv) Copper-T is a contraceptive device that is placed in uterus to prevent pregnancy.

36. A. (i) We have used a converging lens.
 (ii) The characteristics of the image formed :
 (a) It is real. (b) It is inverted (c) It is enlarged.
 (iii) We get the magnification of object, $m = -1$ at the position $2F_1$.

OR

- B. (i) The path of the rays are shown in figure.



(ii) Focal length of concave mirror (f) = -20 cm

We require two times magnified virtual image of the object, therefore $m = 2$

So, $-\frac{v}{u} = 2$

Using mirror formula, $\frac{1}{v} + \frac{1}{u} = \frac{1}{f}$; $\frac{1}{v} + \frac{1}{u} = -\frac{1}{20}$

multiplying by $-v$ to both sides :

$\frac{-v}{v} + \frac{(-v)}{u} = -\frac{(-v)}{20}$; $-1 + 2 = \frac{v}{20} \Rightarrow 1 = \frac{v}{20} \Rightarrow v = 20\text{cm}$

\therefore We know that $m = -\frac{v}{u}$

$$m = \frac{-20}{u} \Rightarrow 2 = \frac{-20}{u} \Rightarrow u = -10 \text{ cm}$$

(iii) Nature of image for concave mirror when object is at focus is Real image.

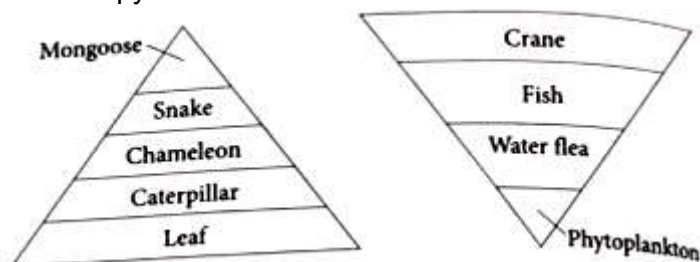
(iv) Virtual image.

37. A. (i) Those elements are called semi-metals or metalloids. Antimony (Sb) and Germanium (Ge) are semi-metals.
 (ii) Copper, platinum do not react with dilute acids.
 B. Gallium has a very low melting point. Iodine is a non-metal which is lustrous.

OR

C. Metal 'M' is aluminium. Al is extracted from Bauxite ($\text{Al}_2\text{O}_3 \cdot 2\text{H}_2\text{O}$).

38. A. Food pyramid for food chain X and Y will be:



OR

B. Food chain X exists in terrestrial ecosystem while food chain Y exists in aquatic ecosystem. No, it is not possible, since the loss of energy at each trophic level is so great that very little usable energy will remain after fourth trophic levels.

C. The flow of energy in food chain B will be

Phytoplankton → Water flea → Fish → Crane

The top consumers in food chain Y will have more energy than those found in food chain X.

D. 0.2 J energy will be available to top consumer in food chain X because only 10% energy is transferred from one trophic level to another.

39. A. The condition when the live wire comes in direct contact with the neutral wire, high current flows through the wire.
 B. Switches are connected in the live wire because when the switch is in the off position, no point of the connected electrical appliance will be at higher potential (220 V).
 C. A fuse of rating 15 A is usually used for appliances like electric iron, geysers and room heater etc.

OR

D. The earthing of any electrical appliance is done to protect the user from any accidental electrical shock due to leakage of current.