

**SET -1**

**Code- 31/1/1**

**Section A**

**Sol 1.** Cyclohexene, Cyclooctyne

**Sol 2.** Faraday's Law of Induction

**Sol 3.** a) (i) Pubic hair appears.

(ii) Hairs under armpits.

b) A low supply of women results in men and their families trafficking women from other areas and leads to increased sexual violence and abuse against women and children, increased child marriages, and increased maternal deaths due to forced abortions and early marriages.

c) Hormonal Contraceptive Methods

d) The rate of birth and death determine the size of population

**Sol 4.** a) Humans can be exposed to pesticides by breathing it, getting it into their mouth, or absorbing it through the skin. In more serious cases, your skin can absorb the pesticide into the body, causing other health effects.

b) Wash fruits and vegetables before eating.

c) Tropic level

d) Consumer

**Sol 5.** (D)

**OR**

**Sol 5.** (D)

- The reactions in which two compounds react by an exchange of ions to form two new compounds are called double displacement reactions.

**Sol 6. (D)**

- Sodium sulphate chemically reacts with barium chloride in the form of their aqueous solution to form a white precipitate of barium sulphate.
- This is a double displacement reaction in which sulphate ions are displaced by chloride ions and vice-versa.

**Sol 7. (C)**

- Sodium bicarbonate is  $\text{NaHCO}_3$  Tartaric acid is  $\text{C}_4\text{H}_6\text{O}_6$  So, the reaction is:
- $\text{NaHCO}_3 + \text{C}_4\text{H}_6\text{O}_6 + 2\text{H}_2\text{O}(\text{l}) = 5\text{CO}_2(\text{g}) + \text{NaOH} + 5\text{H}_2(\text{g})$

**Sol 8. (C)**

- The chemical formula of plaster of Paris is  $\text{CaSO}_4 \cdot \frac{1}{2}\text{H}_2\text{O}$

**Sol 9. (D)**

- The laws of reflection holds good-for light reflected from any smooth surface i.e., all mirrors regardless of its shape.

**OR**

**Sol 9. (A)**

- When an object is placed at the principal focus of a concave mirror, it produces real, inverted, highly enlarged image at infinity

**Sol 10. (D)**

- A short circuit is an electrical circuit that allows a current to travel along an unintended path, often where essentially no (or a very low) electrical impedance is encountered.

- For example, a common type of short circuit occurs when the positive and negative terminals of a battery are connected with a low-resistance conductor, like a wire.
- With low resistance in the connection, a high current exists, causing the cell to deliver a large amount of energy in a short time.

OR

**Sol 10.** (D)

1 Ampere because current is real series

**Sol 12.** (B)

- Incomplete combustion of coal produces carbon monoxide which is a poisonous gas.
- Products after combustion of petrol are carbon monoxide, carbon dioxide, sulphur dioxide, nitrogen dioxide, nitric oxide, volatile organic compounds and hydrocarbons.

**Sol 13.** (B)

- When alcohol is added to carboxylic acid with sodium hydroxide and heated in bath tub, it produces a sweet smell of ester and this process is called Esterification.

**Sol 14.** (A)

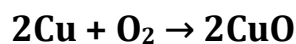
### Section B

**Sol 15.**

- When the “copper powder” is heated in a ‘china dish’, the copper powder surface becomes coated with “black colour substance” due to the formation of ‘copper oxide’ by surface oxidation.
- Copper reacts with oxygen in the air upon heating and forms copper oxide. The black colour is due to the formation of this copper (II) oxide.

- The copper oxide thus formed can be reduced to its basic metal form by reducing it with hydrogen or carbon monoxide.

The equation of 'copper (II) oxide' formation is:



**Sol 16.**

The three products of the chlor-alkali process are Sodium Hydroxide (NaOH), chlorine (Cl) and hydrogen (H).

**Uses of sodium hydroxide (NaOH):**

- It is used in the manufacturing of paper.
- It is used for making soaps and detergents.
- It is used for making rayon artificial textile fibres.

**Uses of chlorine (Cl):**

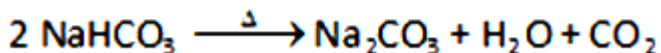
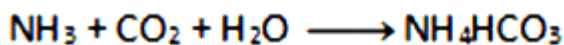
- It is used in the production of bleaching powder.
- It is used in the production of hydrochloric acid (HCl).
- It is used to make plastics (PVC), pesticides chlorofluorocarbon (CFCs), chloroform carbon tetrachloride, Paints e.t.c.

**OR**

**Sol 16.**

- Washing soda is sodium carbonate containing 10 molecules of water of crystallisation.
- It is called as sodium carbonate decahydrate. It is prepared by Solvay's process.

- A cold and concentrated solution of sodium chloride is reacted with ammonia and carbon dioxide to obtain sodium hydrogen carbonate.
- It can remove temporary and permanent hardness from water. Sodium carbonate is soluble but calcium carbonate and magnesium carbonate are insoluble.
- The water is softened because it no longer contains dissolved calcium ions and magnesium ions.
- It will form lather more easily with soap



**Sol 17.**

(i) By adding water in  $\text{KMnO}_4$  solution

(ii) Oxidising agent - it will add oxygen in the ethanol to form Ethanoic acid

(iii)  $\text{C}_2\text{H}_5\text{OH}$  (Alk. $\text{KMO}_4$ ) ----->  $\text{CH}_3\text{COOH}$

**Sol 18.**

- Adrenal gland secretes adrenaline hormone.
- It regulates our breathing, heartbeat, blood pressure and the metabolism of carbohydrate.
- It is secreted in large amount when the person is frightened.
- This increases heartbeat, breathing, blood pressure rises and more glucose goes into blood to release energy which helps us to fight the situation.

OR

**Sol 18.**

- In animals, the messages are communicated in the form of nerve impulses quickly. But still, there are some limitations to the nervous system.
- Nerve impulses can reach only those cells which are connected by the nervous tissues.
- And the cells connected by nervous tissues, after generation and transmission of the impulse, take some time to rest before the generation and transmission of new impulse.
- In simple words, cells cannot continuously generate and transmit nerve impulses.
- This is the reason why most multicellular organisms use another form of control and coordination, named chemical coordination.
- The advantage of chemical coordination is that the information spreads out throughout the body by blood (then the required part picks it up...as per its requirement) and the effect generally lasts longer.

**Sol 19.**

- Pollination is when pollen grains from an anther, the male portion of a flower, are transferred to a female part in the flower, known as the stigma.
- In order for pollination to be successful, the pollen grains transferred must be from a flower of the same species.

Types of Pollinations:

<b>Self-pollination</b>	<b>Cross-pollination</b>
This type of pollination occurs when	A more complex type of pollination

pollen grains from the anther fall directly onto the stigma of the same flower	that involves the transfer of pollen from the anther of one flower to the stigma of a different flower.
Although this type of pollination is simple and quick, it does result in a reduction in genetic diversity because the sperm and egg cells of the same flower share genetic information	This type of pollination results in an increase in genetic diversity because the different flowers are sharing and mixing their genetic information to create unique offspring

### Significance of Pollination

- Pollination is the act of transferring pollen grains from the male anther of a flower to the female stigma.
- Pollination is a very important part of the life cycle of plants. Insects, birds, bats and the wind take pollen between flowering plants, which means the plants can make seeds and reproduce.
- Its significance is to carry the pollen grains to the stigma for the process of fertilisation.
- It is of two types selfpollination (from the anther to the stigma of the same flower) and cross pollination (anther to the stigma of another flower of a different plant of same species).

#### Sol 20.

- Homologous structures are similar structures in related organisms. The most important thing to remember about homologous structures is that they share common ancestry.
- In other words, only organisms that are somehow related to each other can have homologous structures.
- For example, a chimpanzee's arm and a human's arm are homologous structures.
- Both sets of arms have a similar structure and use and chimpanzees and humans share a common ancestor.

Yes, it is necessary that they have a common ancestor, since otherwise there cannot be any similarity in basic plan, origin or internal structure.

**Sol 21.**

- Tyndall effect refers to the scattering of light by colloidal particles.
- The intensity of the scattered light depends on the difference in the refractive indices of the dispersed phase and the dispersion medium.
- Larger the difference, greater will be the intensity of the scattered light.
- In lyophobic sols, the particles are not as highly solvated as in lyophilic sols. So, the difference in refractive indices between the particles and the medium is quite large in lyophobic sols. Therefore, they show distinct Tyndall effect.

**Four instances of Tyndall effect as following**

- Shining a flashlight beam into a glass of milk is an excellent demonstration of the Tyndall effect. You might want to use skim milk or dilute the milk with a bit of water so you can see the effect of the colloid particles on the light beam.
- An example of how the Tyndall effect scatters blue light may be seen in the blue color of smoke from motorcycles or two-stroke engines.
- The visible beam of headlights in fog is caused by the Tyndall effect. The water droplets scatter the light, making the headlight beams visible.
- The Tyndall effect is used in commercial and lab settings to determine the particle size of aerosols.

**OR**

**Sol 21.**

<b>Glass slab</b>	<b>Glass prism</b>
In the case of a glass slab, the two interfaces the light ray has to pass are parallel to each other.	In the case of a prism, the two interfaces the light ray has to pass are not parallel to each other



	and are inclined at an angle.
In this case the emergent ray is also a white light because the constituents of white light which are refracted at different angles at the first interface recombine at the second interface and emerge as a single white light.	In this case, the effects of the first interface are not reversed and the colours separated at that first interface continue along different paths upon leaving the glass at the second interface. Hence we observe a spectrum on the other side.

(i)

a) A Monochromatic light passes through the glass slab and refracts and emerged out. But we can observe the same color throughout. Even after emerging out

b) When it is passed through a glass prism, it refracts and the refracted ray is parallel to one side of a prism. Here also, the color of the light doesn't change

(ii)

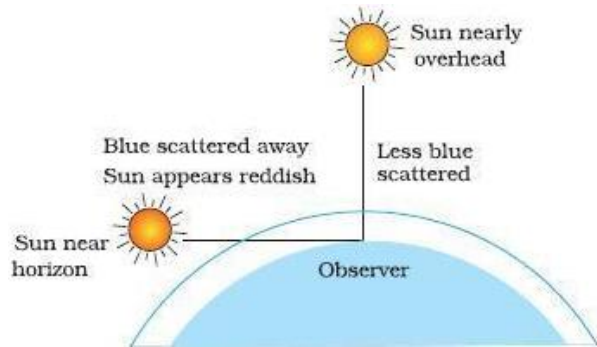
a) White light refracts and simultaneously, dispersion happens and it gets split into its constituent colours

b) Refraction happens and also dispersion happens and its constituent colours.

**Sol 22.**

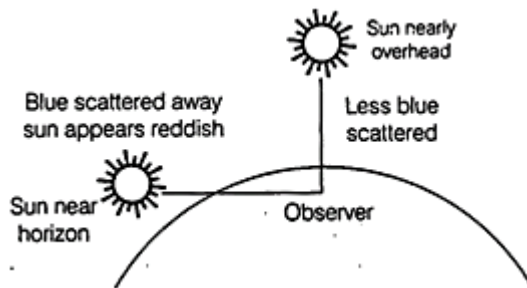
(i)

- During sunrise and sunset, the rays have to travel a larger part of the atmosphere because they are very close to the horizon. Therefore, light other than red is mostly scattered away.
- Most of the red light, which is the least scattered, enters our eyes. Hence, the sun and the sky appear red.



(ii)

- At noon, the sun is overhead in the sky and the light coming from the sun travels a relatively shorter distance through the atmosphere to reach the earth.
- As the light coming from the overhead sun contains almost all its component colours in the right proportion, the sun appears white to us at noon.



**Sol 24.**

(a)

- When an electric current passes through a conductor for some time, the conductor gets heated up.
- Thus heating of a conductor due to the flow of electric current through it is known as Joule's law of heating.

$$\text{Heat generated } H = i^2Rt$$

where  $i$  is the amount of current flowing through the conductor,  $R$  is the resistance of conductor and  $t$  is the time for which the current has flown.

(b)

Given Charge,  $Q = 96000\text{C}$

Time,  $t = 2\text{hr} = 60 \times 60 \times 60 \times 60$

$= 129600\text{s}$

Potential difference,  $V = 40\text{volts}$

Now we know that  $H = VIt$

So we have to calculate  $I$  first

As  $I = Q/t$

$I = 96000/129600$

$= 0.740\text{A}$

Therefore, the heat generated is **29.60 J**.

### Section C

**Sol 25.**

- This is because sodium and magnesium are more reactive than carbon.
- This means that carbon cannot reduce the oxides of these metals.
- The two metals are above carbon in the reactivity series and thus have a high affinity to oxygen than carbon does and thus cannot be reduced by it.
- These metals are less reactive than the neighbouring alkali metal.
- Magnesium is less active than sodium; calcium is less active than potassium; and so on.
- These metals become more active as we go down the column.

- Magnesium is more active than beryllium; calcium is more active than magnesium; and so on.
- Metals of high reactivity; such as sodium, calcium, magnesium, aluminium, etc. are extracted from their ores by electrolytic reduction.
- These metals cannot be reduced using carbon because carbon is less reactive than them.

**Sol 26.**

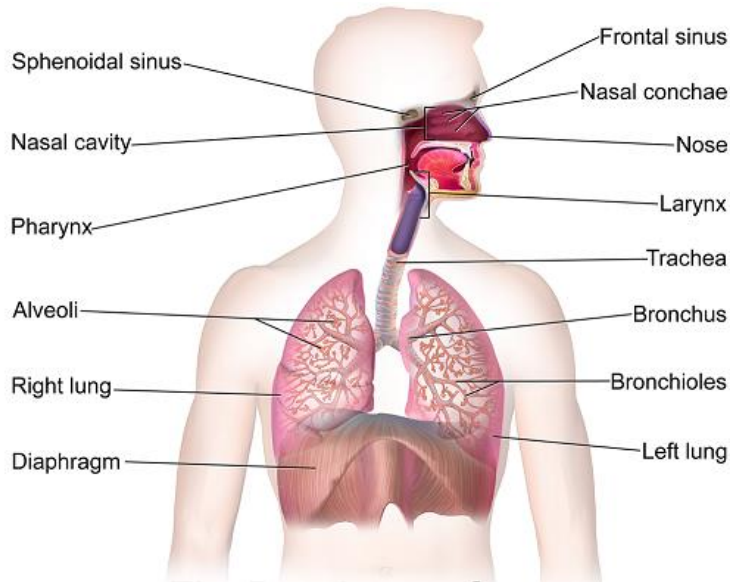
- (i) Element (E) Si only form covalent compounds
- (ii) Oxygen with a valency 2
- (iii) Beryllium is a metal with valency 2
- (iv) Argon (F) has largest size
- (v) Helium, Neon, Argon (H, C, F) belongs to inert gas group

**Sol 27.**

a)

- Aquatic animals take in the oxygen dissolved in water. The amount of dissolved oxygen in water is fairly low compared to the amount of oxygen in the air.
- Therefore, rate of breathing in aquatic organisms is much faster than in terrestrial organisms.
- The breathing rate of aquatic animals is faster than that of terrestrial animals because the amount of dissolved oxygen in the water is much less than the amount on land,
- So they have to breathe more in order to get more oxygen.

b)



OR

**Sol 27.**

a)

- The excretory system is the system of an organism's body that performs the function of excretion, the bodily process of discharging wastes.
- The Excretory system is responsible for the elimination of wastes produced by homeostasis.
- There are several parts of the body that are involved in this process, such as sweat glands, the liver, the lungs and the kidney system.
- Every human has two kidneys.
- Each kidney is made up of three sections: the renal cortex, the renal medulla and the renal pelvis.
- The blood arrives at the kidney via the renal artery, which splits into many afferent arterioles.
- These arterioles go to the Bowman's Capsules of nephrons, where the wastes are taken out of the blood by pressure filtration.
- Peritubular capillaries also surround the nephron so substances can be taken in and out of the blood.

- The renal cortex is the outer layer of the kidney and the medulla is the inner layer of the kidney.
- The renal pelvis takes urine away from the kidney via the ureter.
- Both of the ureters lead the urine into the body's only urinary bladder, which expands and sends nerve impulses when full.
- From there, urine is expelled through the urethra and out of the body.

b)

- Each kidney consists of millions of functional units called nephrons.
- Urine is formed in the kidneys through a filtration of blood.
- The urine is then passed through the ureters to the bladder, where it is stored.
- During urination, the urine is passed from the bladder through the urethra to the outside of the body.

**Sol 28.**

a)

- The law of dominance states that the allele expressed in the heterozygous condition is termed as dominant and the allele which cannot express itself in the heterozygous condition is called as recessive.
- Recessive traits are expressed only in homozygous recessive conditions.
- Let us take an example of tall and dwarf in pea plant. When pure line tall (TT) plants were crossed with pure line dwarf (tt) plants, offspring were all heterozygous tall (Tt).
- Hence, allele tall (T) is dominant over allele dwarfs (t).

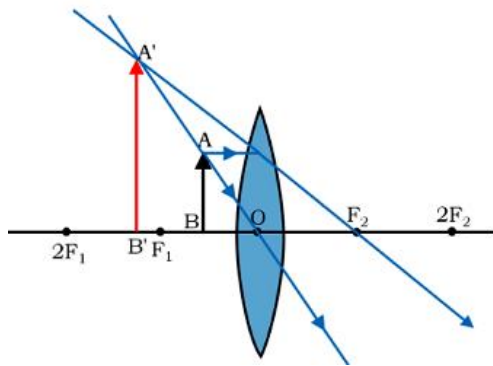
<b>Gametes</b>	<b>T</b>	<b>T</b>
<b>t</b>	<b>Tt</b>	<b>Tt</b>
<b>t</b>	<b>Tt</b>	<b>Tt</b>
<b>Offspring are all tall</b>		

b)

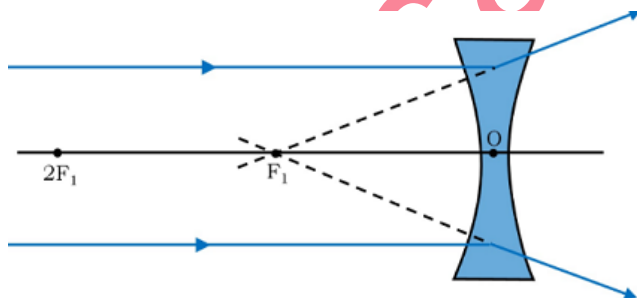
- Such traits are not inherited by their progeny it is because these are the changes which does not have any effect on DNA of the germ cells.
- As the traits acquired during life time of an individual does not interfere with the genetic makeup of the DNA of the germ cells, they are not inherited.

**Sol 29.**

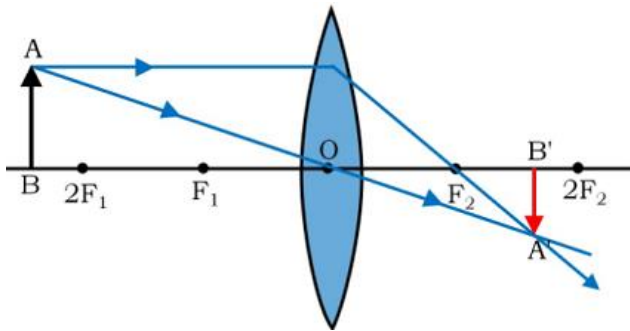
a)



b)



c)



d)

- A magnification of 2 indicates the image is twice the size of the object and a magnification of 1 indicates an image size being the same as the object size.
- If the magnification is positive, then the image is upright compared to the object (virtual image).

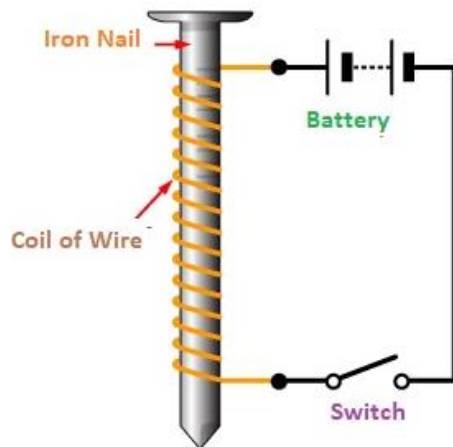
**Sol 30.**

a)

- Electromagnets are used in all kinds of electric devices, including hard disk drives, speakers, motors, and generators, as well as in scrap yards to pick up heavy scrap metal.
- They're even used in MRI machines, which utilize magnets to take photos of your insides!

b)





c)

It is because of following reasons.

- Soft iron core can easily gain magnetism when current flows around it if you will take steel in place of it.
- Steel will take much time to lose its magnetism after current flow is stopped.
- While soft iron will quickly lose its magnetism after the current flow stops

d)

- The strength of an electromagnet can be increased by increasing the number of loops of wire around the iron core and by increasing the current or voltage.
- You can make a temporary magnet by stroking a piece of iron or steel (such as a needle) along a permanent magnet.