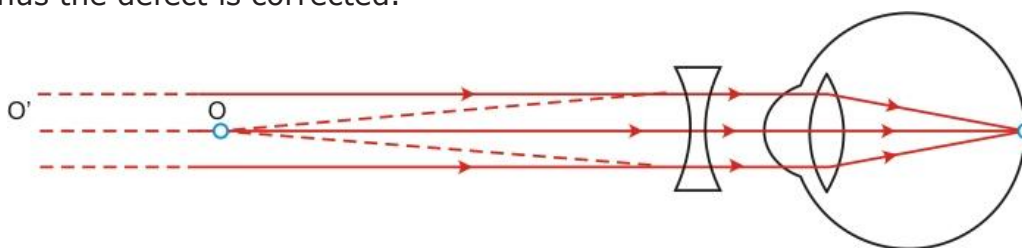


**Tripura Board
Class X Science
Sample Paper 1 – Solution**

**Group A
Physics**

1. The unit of resistivity is ohm-metre.
2. Biogas is a mixture of methane, carbon dioxide, hydrogen and hydrogen sulphide.
3. a) Fleming's Left Hand Rule
The direction of rotation of the wheel can be determined by applying Fleming's left hand rule. During rotation when a spoke of the wheel just leaves the mercury, the circuit breaks, but due to inertia of motion, the wheel continues its motion and brings the next spoke in contact with the mercury, thereby restoring electrical contact. In this way, rotation of the wheel continues.
4. Electromagnetic induction (EMI) is the phenomenon of generating EMF by changing the number of magnetic lines of force associated with a circuit. The EMF so generated is called induced EMF, and the corresponding current is called induced current.
5. Two advantages of AC over DC:
 - a) Loss of energy during transmission is negligible for AC.
 - b) It is cheaper to generate AC than DC.
6. A person with myopia can see nearby objects clearly but cannot see distant objects distinctly.

This defect can be corrected by using a concave lens of suitable power. A concave lens of suitable power will bring the image back onto the retina and thus the defect is corrected.



7. The Sun appears red during sunrise and sunset because the rays from the Sun travel a longer distance as compared to the distance travelled at noon. Sun rays contain seven colours, of which red has the highest wavelength. Thus, red is not scattered by the atmosphere and reaches the Earth, while the other colours (such as blue) get scattered. Thus, the Sun appears reddish.

8.

| Nuclear Fusion | Nuclear Fission |
|---|---|
| 1. It is the fusing of two or more lighter atoms into a larger one. | 1. It is the splitting of a large atom into two or more smaller ones. |
| 2. Extremely high energy is required. | 2. Takes little energy to split two atoms in a fission reaction. |

9. Let the resistance of the combination of R_2 , R_3 and R_4 be x , then

$$\frac{1}{x} = \frac{1}{R_2 + R_3} + \frac{1}{R_4} = \frac{1}{6} + \frac{1}{3} = \frac{1}{2}$$

$$\therefore x = 2 \Omega$$

Hence, the equivalent resistance of the circuit =

$$R = R_1 + x + R_5$$

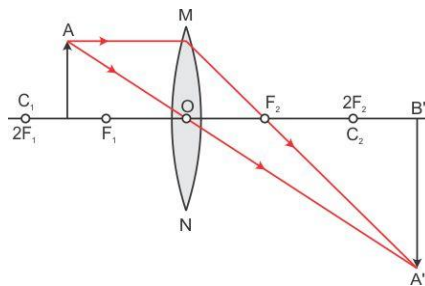
$$R = 3 + 2 + 3$$

$$\therefore R = 8 \Omega$$

10. When a certain amount of current flows through a resistor for a time interval, it develops a certain amount of heat in that resistor. This heat given out by the resistor is given by Joule's law of heating. It is given as $H = I^2 R t$, where I is the current, R is the resistance and t is the time for which current flows.

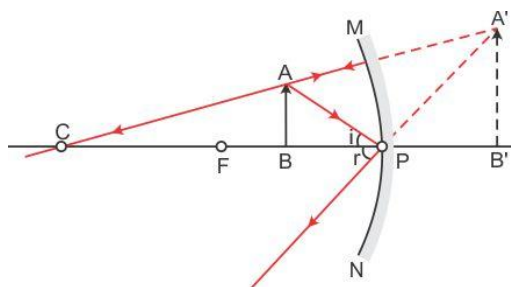
11.

| Position of the object | Position of the image | Size of the image | Nature of the image |
|--------------------------|-----------------------|-------------------|---------------------|
| Between F_1 and $2F_1$ | Beyond $2F_2$ | Enlarged | Real and inverted |



OR

| Position of the object | Position of the image | Size of the image | Nature of the image |
|------------------------|-----------------------|-------------------|---------------------|
| Between P and F | Behind mirror | Enlarged | Virtual and erect |



12.

- (a) Distances measured upward and perpendicular to the principal axis are taken as positive. Distances measured downward and perpendicular to the principal axis are taken as negative. A real image is formed below the principal axis, and a virtual image is formed above the principal axis. So, magnification for a real image is taken as negative and that for a virtual image is taken as positive.
- (b) A convex mirror is used as a rear-view mirror in vehicles because it always produces an erect and diminished image of the objects and it has a wide field of view.
- (c) Given: Power of convex lens $P=4.5$

$$\text{Power } P = \frac{1}{\text{Focal length}} = \frac{1}{f}$$

$$F = \frac{1}{4.5} = 0.22 \text{ m}$$

OR

(a) Define:

- i. The centre of curvature of a spherical mirror is the centre of the hollow sphere of glass of which the mirror is a part.

ii. The centre of the spherical surface (reflecting) of the mirror is called its pole.

(b) Mirror formula, $\frac{1}{f} = \frac{1}{v} + \frac{1}{u}$

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

where f is the focal length of the mirror

v is the image distance

u is the object distance

(c) Given:

$v = -45$ cm (real and inverted image)

$f = -20$ cm (concave mirror)

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

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

$$\frac{1}{u} = \frac{1}{-20} - \frac{1}{-45} = \frac{-9 + 4}{180} = \frac{-5}{180}$$

$$u = -36 \text{ cm}$$

The object should be placed at a distance of 36 cm in front of the concave mirror.

GROUP B CHEMISTRY

13. (d) MgSO_4

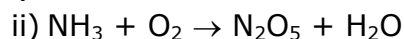
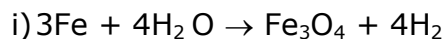
MgSO_4 is a salt formed from the reaction of a strong base (magnesium hydroxide) with a strong acid (sulphuric acid).

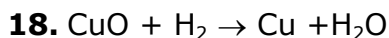
14. Stainless steel is made of steel mixed with elements such as chromium, nickel, molybdenum, silicon, aluminium and carbon. Iron mixed with carbon to produce steel is the main component of stainless steel.

15. The second member of the ketones is butanone (2-butanone).

16. Carbon dioxide and methane are two greenhouse gases.

17.





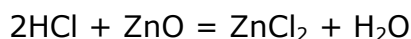
In this redox reaction, CuO is reduced to Cu because oxygen is removed. So, the conversion of CuO to Cu is a reduction reaction. H₂ is oxidised to H₂O. So, it is also an oxidation reaction.

19. Amphoteric oxides are oxides which react with both acids and alkalis to give salt and water.

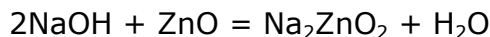
Zinc oxide (ZnO) reacts with hydrochloric acid (HCl) as well as sodium hydroxide (NaOH) to give salt and water. Salts formed in respective cases are zinc chloride (ZnCl₂) and sodium zincate (Na₂ZnO₂).

Reactions:

With acid



With base



20.

- i. It is important to conserve forests because they constitute our most precious wealth.
- ii. Forests are the habitat for wildlife and they are an important constituent of the various food chains and food webs.
- iii. Forests purify air and protect the Earth from the greenhouse effect by removing carbon dioxide and converting it to oxygen.
- iv. Forests provide employment to a large number of people and help in generating revenue.

21.

- i. The chemical formula of Bleaching Powder is CaOCl₂, and its chemical name is calcium oxychloride.
- ii. It is prepared by passing chlorine gas over dry slaked lime.
 $\text{Ca}(\text{OH})_2 + \text{Cl}_2 \rightarrow \text{CaOCl}_2 + \text{H}_2\text{O}$
- iii. It is used as a disinfectant and germicide especially in the sterilisation of drinking water and for the manufacture of chloroform.

22.

- i. Titanium is produced by reducing titanium chloride using a more reactive metal such as sodium or magnesium.
- ii. Anode: Impure copper; Cathode: Thin strip of pure copper; Electrolyte: Copper sulphate solution
On the electrolytic refining of less reactive metals, the heavy impurities get deposited as an insoluble mass near the anode called anode mud.

23.

- i. According to the modern periodic law, the physical and chemical properties of elements are periodic functions of their atomic numbers.
- ii. When we move from left to right across a period, the number of shells in the atom remains the same but the number of valence shell electrons increases. So, the effective nuclear charge on the electrons also increases resulting in a smaller size of atoms. For example, take the case of period 2 elements, Li, Be, B, C, N, O, F, Ne. The number of orbitals (shells) in all these elements is the same (i.e. 2 shells), but the number of valence electrons increases as we move from left to right. This results in an increase in nuclear charge on the outermost shell (L shell) of the atoms moving from left to right. Hence, the atomic size decreases.
- iii. Period 3, Group 1

24.

- i. $\text{CH}_3\text{-CH}_2\text{OH} + \text{Na} \rightarrow 2\text{C}_2\text{H}_5\text{ONa} + \text{H}_2$
- ii. When 2% aqueous solution of KMnO_4 is used, unsaturated hydrocarbon is confirmed by the disappearance of purple colour.
- iii. a. Ethanoic acid
b. Propan-2-ol

OR

- i. Soap is made using fat and alkali by the saponification method, whereas detergents are carbonic compounds which are not alkaline.
- ii. Molecules of soap are sodium or potassium salts of long-chain carboxylic acids. A soap molecule has a tadpole-shaped structure. At one end (long non-polar end) of the soap molecule is a hydrocarbon chain insoluble in water but soluble in oil. At the other end (short polar end) of the soap molecule, there is a carboxylate ion, which is hydrophilic, i.e. water soluble but insoluble in oil. On mixing with water, soap forms a concentrated solution and causes foaming. The long non-polar end of soap gravitates towards, surrounds and absorbs dirt. The short polar end with the carboxylate ion turns water away from dirt. A spherical aggregate of soap molecules is formed in the soap solution in water and is called a micelle. The soap molecule thus helps in dissolving the dirt in water, and we can wash our clothes clean.
- iii. Hard water does not form lather because magnesium ions or calcium ions present in hard water react with soap to form magnesium stearate or calcium stearate which forms scum.

Biology
Section A

1. The stomach produces hydrochloric acid.
2. The cerebellum controls body balance.
3. Chlorofluorocarbon

Section B

4. Adrenaline is called emergency hormone because it initiates quick reaction which makes the individual to think and respond quickly to stress. Adrenaline is secreted by the adrenal medulla during stress.

OR

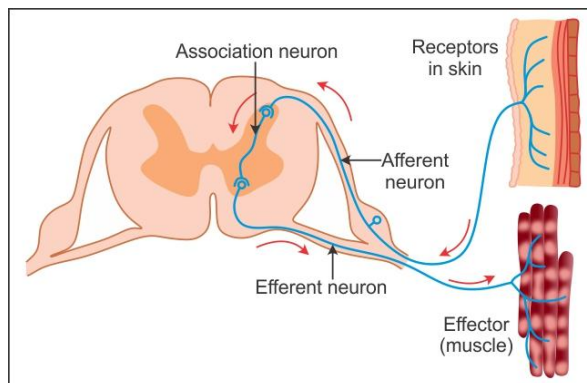
Iodised salt is advisable to help reduce iodine deficiency in humans.

5. Chromosomes present in males are always XY and those in females are always XX. So, if the X chromosome of a father pairs with the X chromosome of a mother, then the child born would be a female.
- 6.

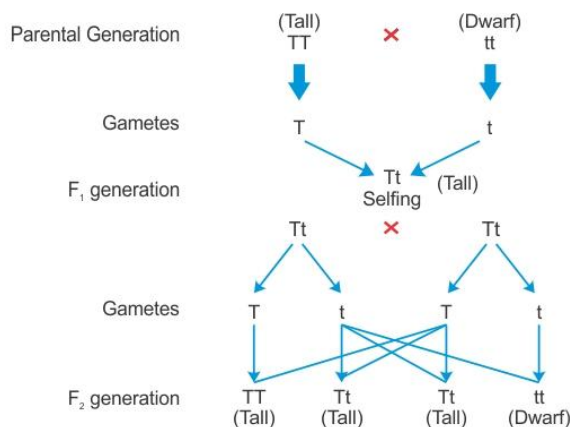
| Homologous Organs | Analogous Organs |
|--|--|
| Homologous organs have similar origin and basic structure but perform different functions in different organisms. | Analogous organs are different in basic structure but perform the same function. |
| Homologous organs show divergent evolution. | Analogous organs show convergent evolution. |
| They develop in related organisms. | They develop in unrelated organisms. |
| Example: Forelimbs of frog and man seem to be built from the same basic design of bones, but they perform different functions. | Example: Wings of birds and bats look similar. Wings are covered by feathers all along the arm in birds, but are skin folds stretched between elongated fingers in bats. |

7. Hydra and yeast
8. They break complex matter to smaller pieces called detritus, which many other animals can eat. They also help to complete the cycle of recycling energy through the ecosystem.

9. Reflex action is an automatic instinctive unlearned reaction to a stimulus. It is a rapid, immediate reaction to a stimulus which is below the level of consciousness.



10.

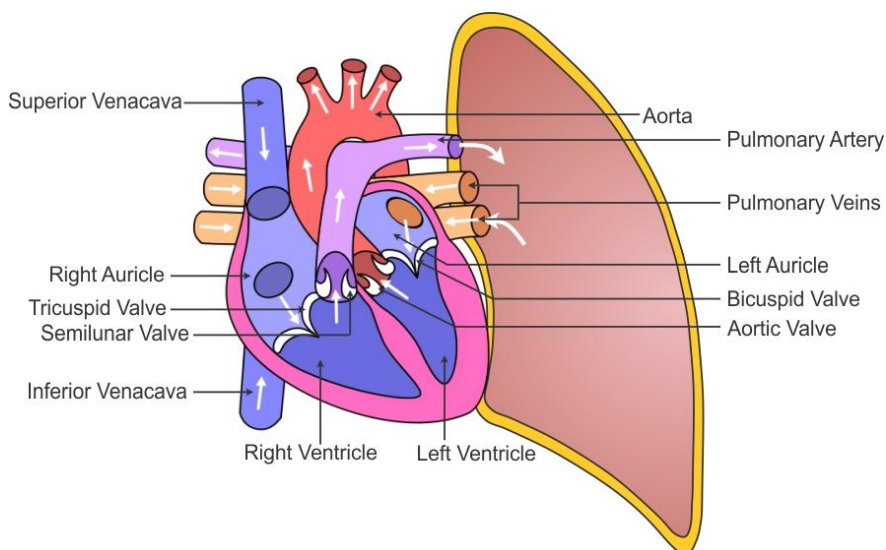


OR

Fossils are the remains of plants and animals which have been preserved in sedimentary rocks. Fossils are the impressions of dead organisms; these dead organisms can be compared through the history of the Earth and can tell a great deal about the changes which various species of organisms have gone through.

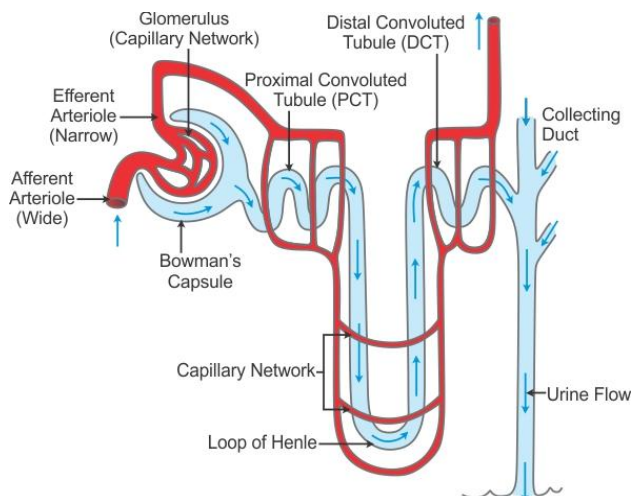
11. Two polar nuclei unite to form a secondary nucleus, and one sperm nucleus from the pollen tube unites with the secondary nucleus to form an endosperm cell (triple fusion = 2 polar nuclei + 1 sperm nucleus). This is the first fertilisation.
The other sperm nucleus enters the egg cell with the assistance of synergids which then degenerate and unite with its nucleus. This is the second fertilisation.

12.



Walls of the left ventricle are thicker than those of the right ventricle, because the left ventricle has to pump blood to more distant parts of the body. If the walls are stronger, then it can exert more pressure and can send blood to distant parts.

OR



Nephrons are the basic structural and functional units of the kidney. They consist of a network of tubules and canals specialised in filtration.

Each nephron is a long tube which runs from the cortex into the medulla and back again to the cortex before joining another tube called the collecting duct.

A nephron has two main parts—renal corpuscle and renal tubule.

Renal Corpuscle

The renal corpuscle is the initial filtering component of the nephron and is made of two structures known as the glomerulus and Bowman's capsule. The Bowman's capsule is a cup-like double membranous structure which contains the glomerulus. A branch of the renal artery, the afferent arteriole, enters the small cup-like space

of the Bowman's capsule as a network of blood capillaries. This network is known as the glomerulus. The glomerular filtration rate is a measure of kidney function.

Renal Tubule

Renal tubules are a duct system beginning at the Bowman's capsule in the cortex, looping through the renal medulla and returning to the cortex to connect to the collecting duct system. Each renal tubule is divided into a proximal convoluted tubule, loop of Henle and distal convoluted tubule. These tubules drain into the collecting duct. Several convoluted tubules drain into each collecting duct.