Goa Board
Class X Science
Term II
Sample Paper – 1 Solution

SECTION A

1. Due to small size and presence of four valence electrons, carbon forms strong bonds with other carbon atoms, hydrogen, oxygen, nitrogen or sulphur.

2. The process is budding and hydra performs this process.

3. Retina converts the light to electrical signals and these signals are carried by the optic nerves to the brain.

4. Resemblance with alkali metals:
Hydrogen has the same outermost electronic configuration as that of alkali metals.

Resemblance with halogens:
Hydrogen exist as diatomic molecule as halogens.

5.

(a) Water shed management is a scientific method of developing land and water resources to increase the biomass production without causing ecological imbalance.

(b) The advantages are:

i. Watershed management only increases the production and income of the watershed community.
ii. It also mitigates droughts and floods.
iii. It increases the life of the downstream dams and reservoirs.

6. Convex mirrors have a very wide field of view as they are curved outwards. So, the convex mirrors enable the driver to view a much larger area than a plane mirror. The images produced are erect and their size is much smaller than the object. Hence, it is used as a rear view mirror in automobiles to see objects at the backside of the vehicle.

7.

(a) Copper-T is placed in the uterus to prevent pregnancy.

(b) If the vas deferens in the male is blocked surgically, sperm transfer will be prevented and fertilization will not occur.

8.

(a) Valency remains same on moving from top to bottom in a particular group. This is because the outermost electronic configuration of all the elements in a group remains the same.

(b) On moving from left to right in a period, the number of valence electrons in elements increases from 1 to 8. The elements in a period have consecutive atomic numbers.

On moving down a group in the periodic table, the number of valence electrons in the elements remains the same.

9. A concave lens always forms a virtual, erect image on the same side of the object.

Given:

Image distance, v=20 cm (It is to the left of lens)

Focal length, f=25 cm (It is a concave lens)

Object distance, u=? (To be calculated)

Putting these values in the lens formula

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

We get, $\frac{1}{u}=\frac{1}{f}+\frac{1}{v}$

$$\frac{1}{u}=\frac{1}{-25}+\frac{1}{-20}$$

u = -100cm

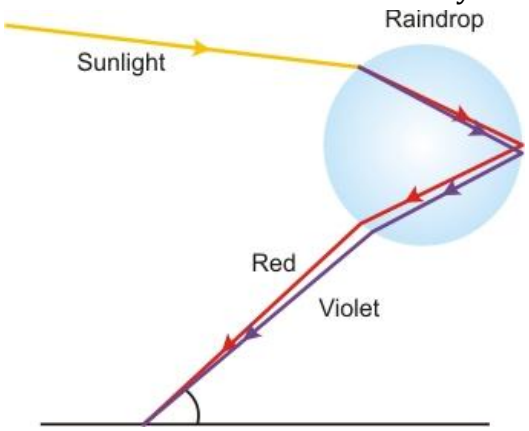
Thus, object distance is 100 cm. The minus sign for object distance shows that object is placed on the left side of the concave lens.

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

$$\therefore m=\frac{-20}{-100}=+0.5$$

Thus, the magnification produced by this concave lens is +0.5. The plus sign for the magnification shows that the image is virtual and erect.

10. Formation of a rainbow: The rainbow is formed in the sky when the sun shines and it is raining at the same time. A rainbow is always formed in a direction opposite to that of the sun. A rainbow is produced by the dispersion of white sunlight by raindrops in the atmosphere. The raindrops in the atmosphere act like many small prisms. As white light enters and leaves these raindrops, the various colours present in white light are refracted by different amounts due to which an arch of seven colours called a rainbow is formed in the sky.



11.

(a) We are able to see distant and nearby objects clearly by changing the focal length of the eye lens. This is called accommodation of the eye.

(b) Ciliary muscles help in changing the curvature of the lens.

(c) At the junction of optic nerve and retina, there are no light sensitive cells, due to which, no vision is possible at that spot. This is called blind spot.

12. The rough focal length of a convex lens is obtained by forming a sharp image of a very distant object on screen. The distance of the screen from the lens gives us the rough focal length of the lens.

This method is not applicable to a concave lens, as image formed by a concave lens is virtual and it cannot be taken on a screen.

13.

(a) X is ethyl ethanoate.

(b) It is saponification reaction.

(c) $CH_3COOC_2H_5 + NaOH \rightarrow C_2H_5OH + CH_3COONa$

14.

(a) By the electronic configuration of an element, we can identify the group and period to which the element belongs.

For example - Oxygen has atomic number 8.

Its electronic configuration is 2, 6.

Oxygen has six electrons in the outermost shell and can gain two electrons to complete its octet; so, it belongs to group 16. Also, since the electrons are filled in two shells, oxygen belongs to the second period.

(b) As we move down the group, electronegativity of elements decreases as the atomic size increases. Nitrogen is placed above phosphorus in group 15. So, nitrogen is more electronegative than phosphorus.

15. Approach of the society is baseless. Sex of the child is determined by the type of chromosome present in the sperm (X and Y) which fuses with the ovum at the time of fertilization.

Associated value: The learner will be able to improve their mindset which will help them to discontinue various social malaise i.e. gender inequality, female foeticide etc.

16.

(a) No.

This is because all the F_1 progeny plants show the genetic makeup Pp, which results in purple flowers.

(b) Dominant trait is a genetic trait that is expressed in a person who has only one copy of that gene.

Recessive trait is a genetic trait that is expressed only when two copies of the gene are present.

17. Incineration is the process of disposing off domestic and industrial (chemical) waste safely without polluting the environment.

It is considered as a safe method of waste disposal because in this process, waste materials are burnt at very high temperature of 1000^oC so that they can be converted into gases and water vapours. The ash thus left behind is also devoid of any harmful particles.

18. Forests are renewable natural resources which are essential for ecological balance of ecosystems. They maintain biological diverstiy, preserve foods and safeguard future of tribals, besides providing valuable product for human welfare and raw materials for industries.

Two causes for deforestation are:

(a) Indiscriminate felling of trees for the purpose of timber, fuel and industrial demand of wood.

(b) Over-grazing by a large livestock population.

19. Ovaries exhibit cycle of events at definite intervals. The ovarian follicles grow into mature follicles. Usually, one mature follicle develops to surround one ovum. The maturing ovum is from one of the two ovaries. The ovum is then released from the respective ovary by the process of ovulation. When the ovarian follicle matures, the inner wall of the uterus thickens to prepare for receiving the developing zygote in case fertilization occurs. In case, fertilization does not take place, the thickened inner wall of the uterus breaks down along with its blood vessels and moves out of the vagina in the form of bleeding, called menstrual flow (menstruation). It lasts for about 4 - 7 days. The cycle of events taking place in the ovaries and uterus after every twenty eight days marked by the menstrual flow, is called menstrual cycle (sexual cycle in human female). In a normal healthy woman, ovulation takes place in the mid of the menstrual cycle around the 14^{th} day. Menstrual cycle occurs every 28 to 38 days.

20.

(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 for a virtual image, it is taken as positive.

(b) A convex mirror is used as 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

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

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

21.

(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 = -45cm (real and inverted image)

f = -20cm (It is 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.

22.

(a) According to Darwin, natural selection is the process which brings about evolution of new species of plants and animals.

It consists of the following process:

i. He noted that the size of the population tends to remain constant despite the fact that more offspring are produced than needed.

ii. Variations provide adaptations.

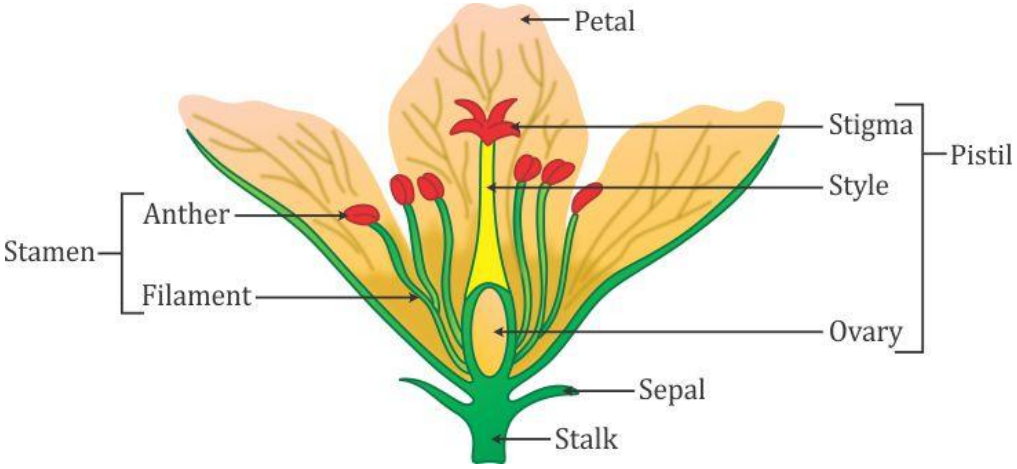
iii. The best adopted survive in the changing environment.

iv. Nature selects the best organisms with better adaptations and after many generations new species are formed.

(b) Both, thorns of *Bougainvillea* plant and tendrils of *Passiflora* plant perform different functions but have similar basic structural design i.e. both are modified branches, and thus are termed as homologous organs.

23.

(a)



L.S of a flower

(b)

Self-pollination	Cross-pollination
Here pollen is transferred from the stamen to the stigma of the same flower.	Here pollen is transferred from the stamen of one flower to the stigma of another flower.
Self-pollination does not need the help of any agents.	Cross-pollination relies heavily on pollinating agents

24.

(a) Catenation: The property of self-linking of atoms of an element through covalent bonds in order to form straight chains, branched chains and cyclic chains of different sizes is known as catenation.

(b) Functional group is -OH group.

ii. Functional group is -COOH group.

(c) C_nH_{2n+2} represents a saturated hydrocarbon.

(d) Methane burns in oxygen with formation of carbon dioxide and water.

$$CH_4 + 2O_2 \rightarrow CO_2 + 2H_2O$$

(e) Conversion of ethanol to ethanoic acid is an oxidation reaction because oxygen is added to ethanol and ethanoic acid is formed.

$$CH_3CH_2OH \xrightarrow{\text{Alkaline } KMnO_4 + \text{Heat}} CH_3COOH + H_2O$$

SECTION B

25. (b) Lime water turns pinkish

On reacting $NaHCO_3$ and acetic acid, carbon dioxide gas is evolved along with formation of sodium ethanoate. This CO_2 gas turns lime water milky.

26. (a) Ester

Ethanol (alcohol) on reaction with ethanoic acid gives ester as one of the products.

27. (d) Oxidation

Aldehydes give carboxylic acids on oxidation (reaction with oxygen).

28. (d) Ovary

Ovary is the swollen part of the flower present at the base of the carpel, which contains female gametes.

29. (b) Elongation of its nucleus

The process of reproduction by binary fission in amoeba begins with the elongation of its nucleus, followed by division of nucleus and cytoplasm and lastly, constriction of the cell membrane to form two daughter cells.

30. (a) (I)

The best set up is given in figure (I). The incoming light should not fall perpendicularly as the light will emerge straight and refraction cannot be traced. The light rays should not be very close or far from the normal as the emergent rays are difficult to trace.

31. (d) D

A concave mirror converges the parallel beam of light falling on it at point F.

32. (b) Endosmosis

Endosmosis is the inward diffusion of water molecules into a cell from a solution.

33. (a) Saponification

Saponification is the process of making soap by hydrolysis of fats and oils with alkalis.

34. (b) (15 cm, 15 cm) and (inverted, inverted)

In each case, the distances l_1 and l_2 give the focal length of the mirror and lens respectively. Also, the image formed in both cases is real and inverted.

35.(c) C

Bud appears as protuberance from the parent cell, which is not observed in figure C.

36. A - Ethanol

B - Ethene

C - Ethane

$$\underset{A}{C_2H_5OH} \xrightarrow{Conc.H_2SO_4} \underset{B}{CH_2=CH_2}$$

$$\underset{B}{CH_2=CH_2} + H_2 \xrightarrow{Ni} \underset{C}{CH_3 - CH_3}$$

$$\underset{C}{CH_3 - CH_3} + 7/2O_2 \rightarrow 2CO_2 + 3H_2O$$