Goa Board
Class X Science
Term II
Sample Paper – 4 Solution

SECTION A

1.

i. Ethanol
ii. Ethanoic acid

2. The minimum distance at which objects can be seen most distinctly without strain is called the near point of the eye. It is 25 cm for normal vision.

3. Variation refers to the number of changes that appear among the same members of species and their offsprings as a result of genetic recombination.

4. Metallic character increases down a group due to increase in atomic size. Thus, the outermost electrons are further away from the nucleus and therefore, can be lost easily. Hence, the electropositive character or the metallic character increases. Non-metallic character decreases down a group due to an increase in its atomic size. Due to an increase in the size of the atom, its nucleus goes more deep inside the atom and the attraction of the nucleus for incoming electrons decreases due to which, the atom cannot form negative ions easily and hence, electronegative character or non-metallic character decreases.

5.

i. Dams ensure round the year water supply to the crop fields and help raise agricultural production.
ii. Generation of electricity.
iii. They control flooding which either stops or slows the amount of water in the river.
iv. Water from a dam is supplied to people in towns and cities through pipelines. In this way, construction of dams ensures continuous water supply in the region.

(Any TWO)

6. Four characteristics of an image formed by a plane mirror are:

i. Image is always erect and virtual.
ii. Image size is same as object size.
iii. Image is laterally inverted.
iv. Image distance is the same as the object distance.

7.

(a) Bryophyllum plants reproduce by vegetative propagation through leaves. The leaves of Bryophyllum plant have special type of buds which get detached from the leaves, fall to the ground, and then produce new Bryophyllum plants.

(b) AIDS and Syphilis.

8.

(a) The properties of elements are the periodic functions of their atomic masses.

(b) In classification of elements, Mendeleev was guided by two factors:

i. Increasing atomic masses

ii. Grouping of similar elements

In order to make sure that elements having similar properties fell in the same vertical column or group, he left some vacant places for elements which were yet to be discovered though he could predict their properties.

(c) No fixed position can be given to hydrogen in Mendeleev's Periodic Table.

9.

(a) We can see atmospheric refraction during summer when objects heat up due to sun rays. The air closer to the object is less dense than the air farther from it. So, the light travels from a lighter to a denser medium and the object seems to be moving due to atmospheric refraction.

(b) The ability to see is called "Vision". The three common defects of vision are

1. Myopia
2. Hypermetropia
3. Presbyopia

10.

(a) The image formed in front of the concave mirror is real; so, 'm' is negative,

Given:

m = -3,

Object distance, u = -10 cm

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

$$-3 = \frac{-v}{-10}$$

$$v = -30 \text{ cm}$$

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

$$\frac{1}{f} = \frac{-4}{30}$$

$$f = -7.5 \text{ cm}$$

Radius of curvature, R = 2f = 2 × (-7.5) = 15cm

(b) A lens is a piece of transparent glass bound by two spherical surfaces.

11. Yes

The pollution in the environment hampers the formation as well as the observation of natural phenomena such as rainbow and twinkling of stars. So, a pollution-free environment would make such phenomena more frequently observable in cities as well.

12.

(a) The air higher up towards the outer space has a lower optical density than the air closer to the surface of the earth. So, the light traveling towards the earth bends more due to dense air and hence, it appears to be higher than its actual height.

(b) Light of shorter wavelength is easily scattered as compared to light of longer wavelength. Red light has the longest wavelength, and hence, it is least scattered. Violet light has the shortest wavelength, and hence, it is the most scattered light.

13.

(a) It is a group of bacteria found in human intestine whose presence in water indicates contamination by disease causing micro-organisms.

(b)

i. They may produce foul smell during decomposition process.

ii. They may produce some harmful gases such as ammonia, methane, carbon dioxide, etc. which can further cause global warming.

14. For the conservation of forests, following movements have been started:

i. 'Chipko Movement' in the village of Garhwal started by Sundarlal Bahuguna.

ii. 'Appiko movement' in Karnataka started by Pandurang Hegde.

iii. Another movement started by Amrita Devi Bishnoi for protection of 'khejri' trees in Khejarli village near Jodhpur.

15.

(a) Archaeopteryx looks like a bird but it has many other features which are found in reptiles. It has feathered wings like those of birds but teeth and tail like those of reptiles.

Archaeopteryx is, therefore, a connecting link between the reptiles and the birds and hence, suggests that the birds have evolved from reptiles.

(b) Evolution may be defined as the formation of wide varieties of organisms which have been evolved from pre-existing organisms through their gradual changes (variations) since the beginning of life.

16. Esters are sweet smelling compounds. They are formed by the reaction of a carboxylic acid with an alcohol in the presence of conc. sulphuric acid.
For example, ethyl ethanoate is prepared by reacting ethanoic acid and ethanol in the presence of conc. sulphuric acid.

$$C_2H_5OH + CH_3COOH \xrightarrow{\text{Conc.}H_2SO_4} CH_3COOC_2H_5 + H_2O$$

17.

(a) Atomic number

(b) This is due to an increase in nuclear charge which tends to pull the electrons closer to the nucleus and reduces the size of the atom.

(c)

i. Group 2

ii. Group 18

18.

(a) Pollination: Transfer of pollen grains from another of a stamen to stigma of a pistil is called pollination.
Cross-pollination: The transfer of pollen from the anther of one flower to the stigma of another flower of a different plant of the same species is called cross-pollination.
Self-pollination: Transfer of pollen from the anther of a flower to the stigma of the same flower or a flower on the same plant is call self-pollination.

(b) Variations are beneficial for species because they give survival advantage even in adverse environmental conditions.

19.

(a)

i. Opening of fallopian tube.

ii. Vagina

iii. Scrotum

iv. Uterus

(b) It is because of the fact that the complexity in structure and function ensures the union of sperm and ovum and the development of the embryo inside the body of the female.

(c) In males, vas deferens is blocked so that, the transfer of sperms can be prevented.

20.

(a) Given:

Object Distance, u= -12cm

Image distance, v =?

Focal Length, f = +8 cm

Putting these values in the lens formula:

1/v - 1/u = 1/f

We get: 1/v - 1/(-12) = 1/8

1/v = 1/8 - 1/12

1/v = (3-2)/24 = 1/24

v = 24

So, Image distance, v = + 24 cm

Thus, the image is formed at a distance of 24 cm from the convex lens.

The plus sign for the image distance shows that the image is formed on the right side of the convex lens.

Magnification, m = v/u

Image distance, v = 24 cm

Object distance, u = - 12 cm

m = 24/(-12)

m = - 2

Since the value of magnification is more than one, so, the image is larger than the object. The minus sign shows that the image is formed below the principal axis. Hence, the image is real and inverted.

Magnification, $m = \frac{h_1}{h_2}$

Magnification, m = -2

Height of object, h_1 = + 7 cm

Height of image, h_2 =?

$$-2 = \frac{h_1}{7}$$

$$h_2 = -2 \times 7 = -14 \text{ cm}$$

Thus, height of image, h_2 = -14 cm

The minus sign shows that this height is in the downward direction i.e. the image is formed below the axis. Thus, the image is real and inverted.

(b)

i. For headlights of a car, we use a concave mirror and headlight is fitted at the principal focus of the mirror. Thus, we get a powerful, parallel beam of light after reflection from the concave mirror.

ii. A convex mirror is used as a side view mirror of a vehicle. Convex mirror forms erect and diminished image of vehicles coming from behind. Thus, it provides a wider field of view to the driver.

21.

(a) When light passes through atmosphere, it is first adsorbed by air molecules, dust particles, smoke and water droplets and then re-radiated in various directions. This phenomenon is called scattering of light.
Examples of scattering of light
Sun looks red at sunset and sunrise, Sky looks dark to astronomers.

(b) We can see atmospheric refraction during summer when the objects heat up due to sun rays. The air closer to the object is less dense than the air farther from it. So, light travels from a lighter to a denser medium and the object seems to be moving due to atmospheric refraction.

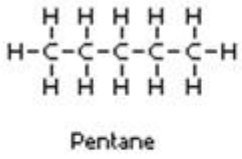
(c) The ability of the eye lens to adjust its focal length is called accommodation.

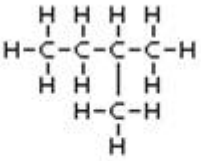
22.

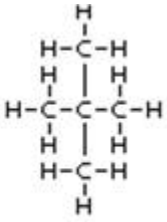
(a) In Covalent compounds, the electrons are shared between atoms and no charged particles are formed. Hence, they are poor conductors of electricity.

(b) Carbon dioxide gas is evolved. It turns lime water milky.

(c) Structural isomers of pentane

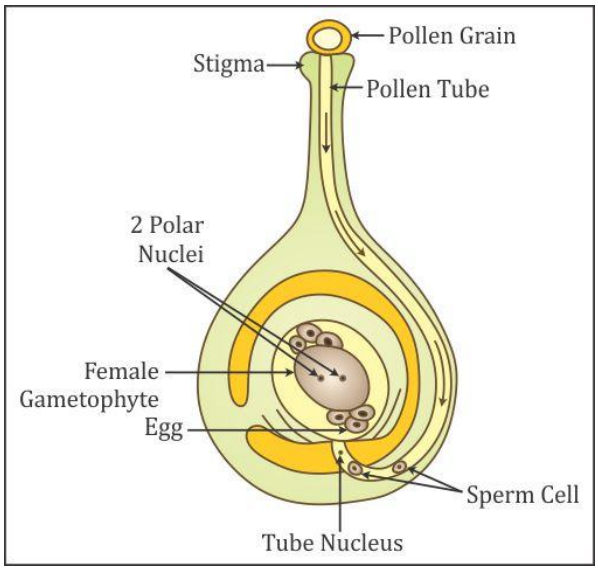

Pentane


Isopentane


Neopentane

23.

(a)



Any four labels; mainly-pollen tube, female gametophyte, sperm cells, egg

(b)

i. The development of foetus inside the uterus till birth is called gestation.
ii. Carnation and Dahlia.
iii. Sporangium.

24.

(a) According to Darwin, natural selection is the process which brings about evolution of new species of plants and animals.
It involves 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 adapted survive in a changing environment.
iv. Nature selects the best organisms with better adaptations and after many generations, new species are formed.

(b) Both perform different functions but have similar basic structural design, i.e. both are modified branches.

SECTION B

25. (b) Lens and the screen only

Difference between the distance of lens and screen gives the focal length of a convex lens.

26. (c) A well lit distant budding

A well-lit distant object is preferred.

27. (c) III

Reaction between acetic acid and water produces a clear solution.

28. (d) Oxidation reaction

The reaction in which oxidising agents supply nascent oxygen for oxidation of alcohols to their respective acids is known as Oxidation reaction.

29. (c) Dehydrating agent

During conversion of ethanol into ethene in the presence of conc. sulphuric acid, a molecule of water is lost. In this reaction, conc. sulphuric acid acts as a dehydrating agent.

30. (c) Pseudopodia

Pseudopodia are extensions of the cell membrane in amoeba and help it in locomotion.

31. (b) II

The most appropriate way of testing the odour is by keeping the liquid at a distance and then trying to test the odour.

32. (a) Swell up

During endosmosis, the raisins absorb water from the solution and thus, swell up.

33. (a) Zygote

Zygote divides by mitosis to form embryo.

34. (c) I and III

Potato and sweet potato are analogous organs in plants and animals and wings of insects and wings of bats are analogous organs in animals are the correct conclusions.

35. (a) A

We must not only have the angle of incidence (nearly) equal to the angle of emergence but also have an idea of the magnitude of the angle of refraction (for a glass slab) for the three most often used values of angle of incidence, i.e. 30^o, 45^o and 60^o.

36.

(a) $CH_3CH_2OH \xrightarrow{O_2} CO_2 + H_2O + \text{Heat}$

(b) $CH_3CH_2OH + Na \rightarrow CH_3CH_2ONa + H_2$