# SCIENCE

**SET-3**                                                    Paper & Solution

Time: 3 Hrs.                                                              Max. Marks: 90

**General Instructions:**

1. The question paper comprises **two** Sections, **A and B**. You are to attempt both the sections.
2. All questions are **compulsory**.
3. There is no choice in any of the questions.
4. All questions of **Section A** and all questions of **Section B** are to be attempted separately.
5. Question numbers **1** to **3** in Section A are one-mark questions. These are to be answered in one word or in one sentence.
6. Question numbers **4** to **6** in Section A are two-mark questions. These are to be answered in about 30 words each.
7. Question numbers **7** to **18** in Section A are three-mark questions. These are to be answered in about 50 words each.
8. Question numbers **19** to **24** in Section A are five-mark questions. These are to be answered in about 70 words each.
9. Question numbers **25** to **33** in Section B are multiple choice questions based on practical skills. Each question is a one-mark question. You are to select one most appropriate response out of the four provided to you.
10. Question numbers **34** to **36** in Section B are two-marks questions based on practical skills. These are to be answered in brief.

## SECTION A

**Question 1.** Write the molecular formula of the $2^{nd}$ and $3^{rd}$ member of the homologous series where the first member is ethyne.

**Solution:** The molecular formula of the $2^{nd}$ and $3^{rd}$ members of a homologous series where the first member is ethyne ($C_2H_2$) is formed by adding $-CH_2-$:

$2^{nd}$ member of alkyne series = propyne ($C_3H_4$) $CH_3 - CH_2 - C \equiv CH$

$3^{rd}$ member of alkyne series = butyne ($C_4H_6$) $CH_3 - CH_2 - C \equiv CH$

**Marks: 1**

**Question 2.** Why is variation important for a species?

**Solution:** Variation increases the chances of survival of a species in a constantly changing environment.

**Marks: 1**

**Question 3.** In the following food chain, 20,000 J of energy was available to the plants. How much energy would be available to man in this chain?

Plants $\rightarrow$ Sheep $\rightarrow$ Man

**Solution:** According to the 10% law, 2 J of energy will be available for the man in this chain.

**Marks: 1**

**Question 4.** An object is placed at a distance of 15 cm from a concave lens of focal length 30 cm. List four characteristic (nature, position, etc.) of the image formed by the lens.

**Solution:** Given,

u = -15 cm (It is to the left of the lens)

f = -30 cm (It is a concave lens)

Using the lens formula $\dfrac{1}{f} = \dfrac{1}{v} - \dfrac{1}{u}$

$\dfrac{1}{v} = \dfrac{1}{f} + \dfrac{1}{u} = \dfrac{1}{(-30)} + \dfrac{1}{(-15)}$

$$\therefore \frac{1}{v} = -\frac{3}{30} = -\frac{1}{10}$$

$\therefore$ v = -10 cm

The negative sign of the image distance shows that the image is formed on the left side of the concave mirror. Thus, the image formed by a mirror is virtual, erect and on the same side as the object.

**Marks: 2**

**Question 5.** You being an environmentalist are interested in contributing towards the conservation of nature resources. List four activities that you can do on your own.

**Solution:** Four activities which can be done as an environmentalist to conserve natural resources are

1) Using public transport for commuting instead of using a personal vehicle.

2) Avoid using clothes, accessories or articles made of animal skin.

3) Using energy-efficient electrical appliances to save electricity.

4) Ensuring no leakage of water taps and pipes at home.

**Marks: 2**

**Question 6.** Why are coal and petroleum categorized as natural resources? Given a reason as to why they should be used judiciously.

**Solution:** Coal and petroleum have been formed by natural processes. They have been formed by the degeneration of dead plant and animal biomass buried deep in the earth several million years ago.

It has taken millions of years for the formation of these fossil fuels, and the present rate of consumption of these fossil fuels far exceeds the rate at which they are formed.

If exhausted, these resources will not be available for use in the near future, and hence, they should be used judiciously.

**Marks: 2**

**Question 7.** Distinguish between esterification and saponification reactions with the help of the chemical equations for each. State one use of each (i) esters, and (ii) saponification process.

**Solution:**

| Esterification | Saponification |
|---|---|
| 1. Carboxylic acid reacts with alcohols in the presence of a little conc. sulphuric acid to form esters. | 1. On treating an ester with a base such as NaOH, it is converted back to alcohol and sodium salt of carboxylic acid. |
| 2. Example: Ethanoic acid reacts with ethanol in the presence of a little conc. sulphuric acid to form esters. $$C_2H_5OH + CH_3COOH$$ $$\downarrow Conc.\,H_2SO_4$$ $$CH_3COOC_2H_5 + H_2O$$ | 2. Example: Ethyl ethanoate on reaction with sodium hydroxide gives ethanol and sodium ethanoate. $$CH_3COOC_2H_5 + NaOH$$ $$\downarrow$$ $$C_2H_5OH + CH_3COONa$$ |

**Use of esters:**

Esters are used in synthetic flavours, perfumes, cosmetics, lacquers, paints and varnishes.
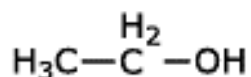
**Use of saponification reaction:**

It is used in the preparation of soaps on a commercial basis.

**Marks: 3**

**Question 8.** Write the structural formula of ethanol. What happens when it is heated with excess of conc. $H_2SO_4$ at 443 K? Write the chemical equation for the reaction stating the role of conc. $H_2SO_4$ in this reaction.

**Solution:** Structural formula of ethanol:

$$H_3C - \overset{\overset{\displaystyle H_2}{|}}{C} - OH$$

On adding conc. sulphuric acid to ethanol and heating the mixture up to 443 K (443 K - 273 = 170 °C) gives ethene.

$$C_2H_5OH \xrightarrow[170°C]{Conc.H_2SO_4} CH_2 = CH_2 + H_2$$
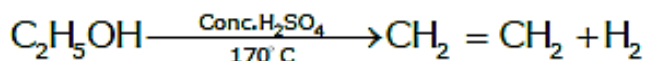
The role of conc. H2SO4 in the above reaction is that it is used as a dehydrating agent and causes dehydration of ethanol.

**Marks: 3**


**Question 9.** What is periodicity in properties of elements with reference to the Modern Periodic Table? Why do all the elements of the same group have similar properties? How does the tendency of elements to gain electrons change as we move from left to right in a period? State the reason of this change?

**Solution:** Properties which reappear at regular intervals or in which there is gradual variation at regular intervals are called **periodic properties**, and the phenomenon is known as the periodicity of elements. Elements in the same group or column have the same number of electrons in their outermost shell. Hence, elements of the same group have similar properties.

On moving across a period from left to right, the tendency to gain electrons increases. This is due to an increase in the nuclear pull and a decrease in atomic size.
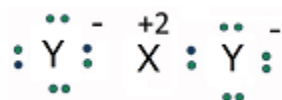
**Marks: 3**


**Question 10.** Write the electronic configuration two elements X and Y whose atomic numbers are 20 and 17 respectively. Write the Molecular formula of the compound formed when element. X reacts with element Y. Draw electron-dot structure of the product and also state the nature of the bond formed between both the elements.

**Solution:** Atomic number of X = 20, electronic configuration = 2, 8, 8, 2
Atomic number of Y = 17, electronic configuration = 2, 8, 7
Molecular formula of the compound = $XY_2$
Electron-dot structure of the compound:

$$:\overset{..}{\underset{..}{Y}}:{}^{-} \quad \overset{+2}{X} \quad :\overset{..}{\underset{..}{Y}}:{}^{-}$$

An ionic bond is formed between the two elements.

**Marks: 3**


**Question 11.** How did Mendel explain that it is possible that a trait is inherited but not expressed in an organism?

**Solution:** Mendel explained that it is possible that a trait is inherited but not expressed in an organism with the help of a monohybrid cross.

An illustration of monohybrid cross
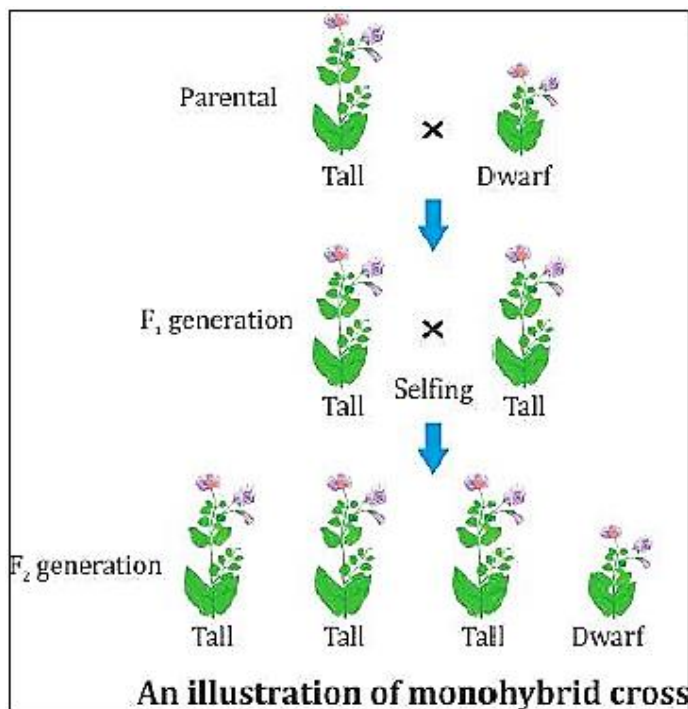
1. He crossed pure-bred tall plants (TT) with pure-bred dwarf plants (tt).

2. The progeny he received in the first filial generation was tall. The dwarfness did not show up in the $F_1$ generation.

3. He then crossed the tall pea plants of the $F_1$ generation and found that the dwarf plants were obtained in the second generation. He obtained three tall plants and one dwarf plant.

**Marks: 3**

**Question 12.** What is an organic evolution? It cannot be equated with progress. Explain with the help of a suitable example.

**Solution:** Organic evolution can be defined as the slow, progressive, natural and sequential development in primitive organisms to form more complex organisms or a new species.

**Marks: 3**

**Question 13.** List the two types of reproduction. Which one of the two is responsible for bringing in more variations in its progeny and how?

**Solution:** Two types of reproduction:

1. Sexual reproduction

2. Asexual reproduction

Sexual reproduction is responsible for bringing in more variations in its progeny.

It takes place by the combination of male and female gametes.

Gametes are formed from one cell which involves copying of DNA and the cellular apparatus. DNA copying is not absolutely accurate, and errors result in new variations. With every DNA copied, a new variation is introduced, and this DNA copy may already have several variations accumulated from the previous generations.

**Marks: 3**

**Question 14.** What is vegetative propagation? State two advantages and two disadvantages of this method.

**Solution:** Vegetative propagation is a type of reproduction in which several plants are capable of producing naturally through their roots, stems and leaves.

Advantages of vegetative propagation:

Plants not capable of producing sexually are produced by this method.

It is a fast and certain method to obtain plants with desired features.

Disadvantages of vegetative propagation:

There is no possibility for variation.

The new plant grows in the same area as the parent plant which leads to competition for resources.

**Marks: 3**

**Question 15.** List three techniques that have been developed to prevent pregnancy. Which one of these techniques is not meant for males? How does the use of these techniques have a direct impact on the health and prosperity of a family?

**Solution:** Techniques to prevent pregnancy:

Use of intra-uterine devices such as Lippes loop and Copper T

Use of condoms

Surgical methods (e.g., tubectomy)

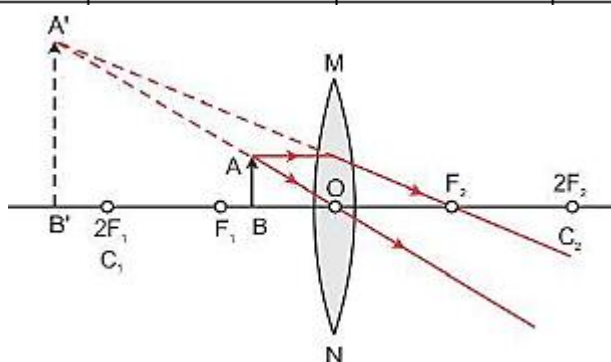Use of intra-uterine devices is not meant for males.

The use of these techniques will keep the mother in good health. With a small family size, parents will be able to provide quality resources to the child such as food, clothes and education. This will improve the overall mental and physical well-being of the family.
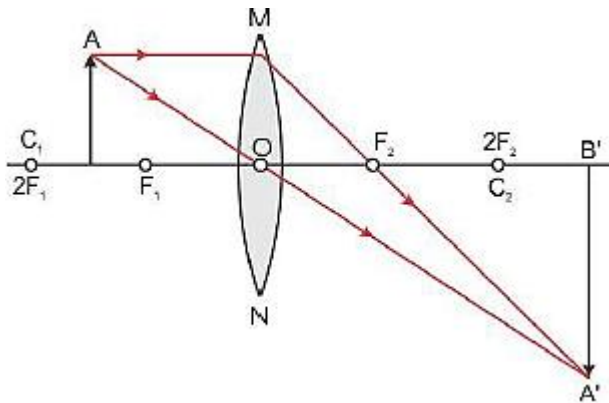
**Marks: 3**

**Question 16.** "A lens can form a magnified erect image as well as magnified inverted image of an object placed in front of it". State the nature of this lens and draw ray diagrams to justify the above statement. Mark the positions of O, F and 2F in the diagram.

**Solution:** Convex lens can form a magnified erect image as well as a magnified inverted image of an object placed in front of it.

| Position of object | Position of image | Size of image | Nature of image |
|---|---|---|---|
| Between focus $F_1$ and optical centre O | On the same side of the lens as the object | Magnified | Virtual and erect |



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

**Marks: 3**

**Question 17.** What is "dispersion of white light"? Draw a labelled diagram to illustrate the recombination of the spectrum of white light. Why it is essential that the two prisms used for the purpose should be identical and placed in an inverted position with respect to each other?
**Solution:** The phenomenon of splitting of white light into its constituent seven colours on passing through a glass prism is called dispersion of light.
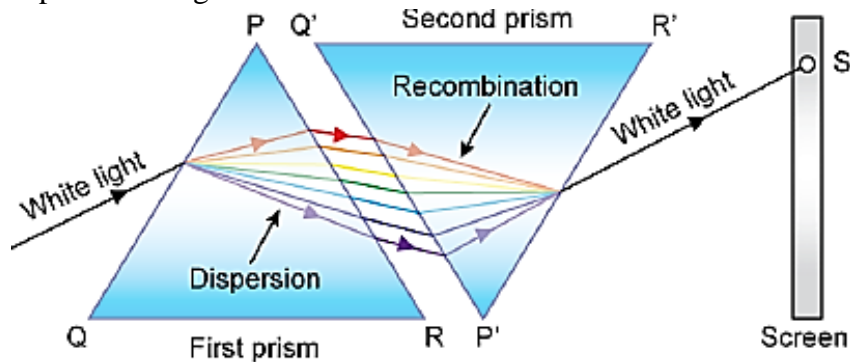


It is essential to place the two identical prisms in an inverted position with respect to each other because the refraction produced by the second prism is equal and opposite to that produced by the first prism.
**Marks: 3**

**Question 18.** (a) Water is an elixir of life a very important natural resource. Your science teacher wants you to prepare a plan for a formative assessment activity, "How to save water, the vital natural resource". Write any two ways that you will suggest to bring awareness in your neighborhood, on how to save water'.
(b) Name and explain any one way by which the underground water table does not go down further.
**Solution:** Two ways by which awareness on how to save water can be created in the neighborhood:
1. By bringing to notice the current situation of drought in rural areas and its dreadful effects on humans and animals
2. Making people realise the importance of water in life and the shortage of water and its consequences in the near future
Khadin is one way of recharging groundwater.
A khadin consists of a 100-300-m long embankment called bund made of earth. The bund is built across the lower edge of the sloping farmland.
Rainwater from the catchment area flows down the slope and collects in front of the bund forming a reservoir.
Pathways through the bund allow excess water to flow through and collect in shallow wells dug behind the bund.

The water which collects in the reservoir and wells seeps into the land and recharges the groundwater.
**Marks: 3**

**Question 19.** With the help of one example for each, distinguish between the acquired traits and the inherited traits. Why are the traits/experiences acquired during the entire lifetime of an individual not inherited in the next generation? Explain the reason of this fact with an example.
**Solution:**

| Acquired Trait | Inherited Trait |
|---|---|
| A trait or characteristic which develops in response to the environment and cannot be inherited. | A characteristic feature inherited from the previous generation. |
| Example: A person learns to swim. | Example: A girl has brown eyes just like her mother. |

Only those traits are inherited which are developed because of changes in genes.
An acquired trait or experience is developed as a response to the environment; it is not inherited. These are not developed due to the changes in genes.
Example: Human beings experiencing weight loss due to starvation. There will be reduction in weight as a response to starvation. This will result in the reduction in the number of body cells or overall body-mass ratio of the individual. It will not have any effect on the genetic constitution of the individual. Because there is no change in the gene of the individual, it is not an acquired trait.
**Marks: 5**

**Question 20.** (a) Write the functions of each of the following parts in a human female reproductive system:
(i) Ovary
(ii) Uterus
(iii) Fallopian tube
(b) Write the structure and functions of placenta in a human female.
**Solution:** (i) Ovary: It produces female gametes. One ovum is released by one ovary every month. It also secretes hormones oestrogen and progesterone.
(ii) Uterus: It protects and nourishes the developing embryo.
(iii) Fallopian tube: It passes down the ovum towards the uterus released by the ovary.
Structure of the placenta in human female:
1. The placenta is a disc which is embedded in the uterine wall.
2. It contains villi on the embryo side. The mother's end of the placenta has blood spaces which surround the villi.
Functions of the placenta in human female:
1. Nutrients and oxygen are received by the foetus from the mother's blood.
2. The foetus gives away waste products and carbon dioxide to the mother's blood for excretion.
**Marks: 5**

**Question 21.** Why certain compounds are called hydrocarbons? Write the general formula for homologous series of alkanes, alkenes and alkynes and also draw the structure of the first member of each series. Write the name of the reaction that converts alkenes into alkanes and also write a chemical equation to show the necessary conditions for the reaction to occur.
**Solution:** Certain compounds contain only carbon and hydrogen. So, these organic compounds are called hydrocarbons.
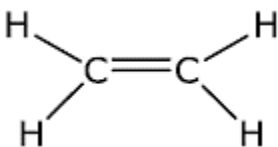
General formula for the homologous series of alkanes $= C_nH_{2n+2}$
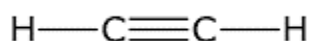First member of the alkane family is methane.
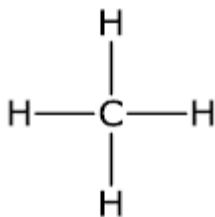


General formula for the homologous series of alkenes $= C_nH_{2n}$
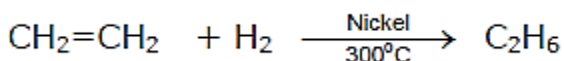First member of the alkene family is ethene.



General formula for the homologous series of alkynes $= C_nH_{2n-2}$
First member of the alkyne family is ethyne.

$$H\!-\!\!-C\equiv C\!-\!\!-H$$

Catalytic hydrogenation is the reaction used to convert alkenes to alkanes.

$$CH_2{=}CH_2 \ + H_2 \ \xrightarrow[\text{300}^{\circ}\text{C}]{\text{Nickel}} \ C_2H_6$$

**Marks: 5**

**Question 22.** (a) A student suffering from myopia is not able to see distinctly the object placed beyond 5 m. List two possible reasons due to which this defect of vision may have arisen. With the help of ray diagrams explain.
(i) Why the student is unable to see distinctly the objects placed beyond 5 cm from his eyes.
(ii) The type of the corrective lens used to restore proper vision and how this defect is corrected by the use of this lens.
(b) If, in this case, the numerical value of the focal length of the corrective lens is 5 m, find the power of the lens as per the new Cartesian sign convention.
**Solution:** (a) This defect may arise due to excessive curvature of the eye lens or elongation of the eyeball.
(i) A person with this defect has the far point nearer than infinity. Such a person may see clearly up to a distance of a few meters.
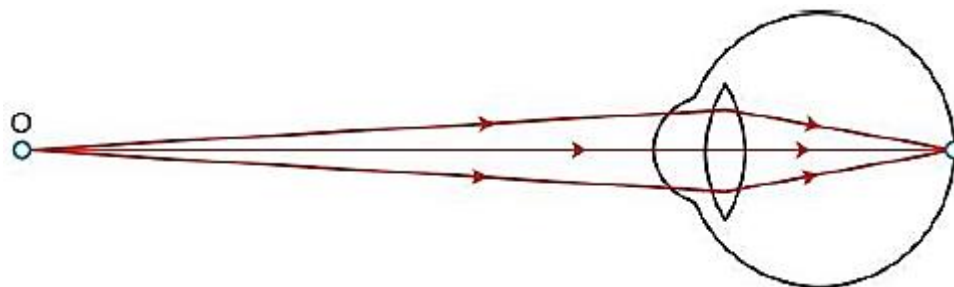


In a myopic eye, the image of a distant object is formed in front of the retina and not at the retina itself.
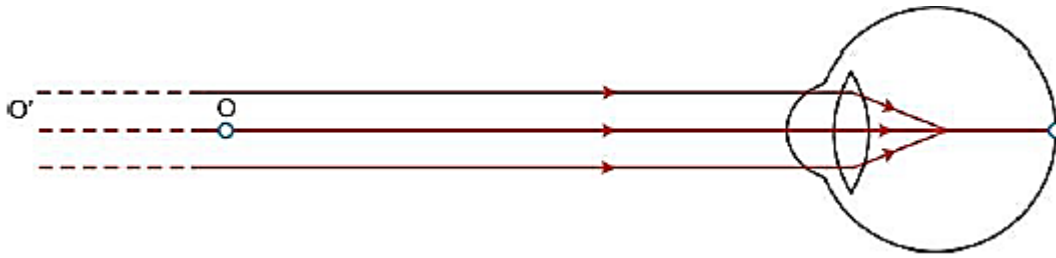
(ii) This defect can be corrected by using a concave lens of suitable power. A concave lens of suitable power will bring the image back onto the retina and thus the defect is corrected.
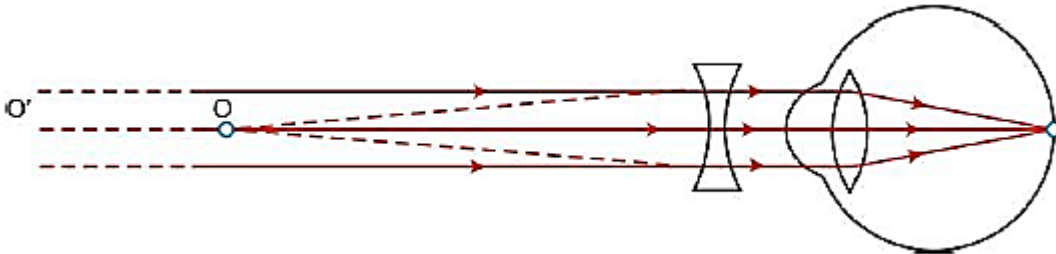


(b) Given: Focal length f = -5 m ($\because$ it is a concave lens)

Power, $P = \dfrac{1}{f \text{ (in m)}} = \dfrac{1}{-5} = -0.2D$

The negative sign indicates that it is a diverging lens or concave lens.

**Marks: 5**

**Question 23.** Analyse the following observation table showing variation of image distance (v) with object distance (u) in case of a convex lens and answer the questions that follow without doing any calculations:

| S. No | Object Distance u (cm) | Image Distance v (cm) |
|-------|------------------------|-----------------------|
| 1 | − 100 | + 25 |
| 2 | − 60 | + 30 |
| 3 | − 40 | + 40 |
| 4 | − 30 | + 60 |
| 5 | − 25 | + 100 |
| 6 | − 15 | + 120 |

(a) What is the focal length of the convex lens? Give reason to justify your answer.

(b) Write the serial number of the observation which is not correct. On what basis have you arrived at this conclusion?

(c) Select an appropriate scale and draw a ray diagram for the observation at S. No. 2. Also find the approximate value of magnification.

**Solution:** (a) When the object distance and the image distance are the same, it means that the object is placed at 2f or the image is formed at 2f. From the table, it is clear that 2f = 40 cm. Therefore, the focal length of the convex lens is 20 cm.

(b) Serial number 6 is incorrect. Given that the object is placed at 15 cm which is between the focal length and the lens. Thus, the image should be formed on the same side as the object. The data given in the observation serial number 6 does not satisfy the condition.

(c)
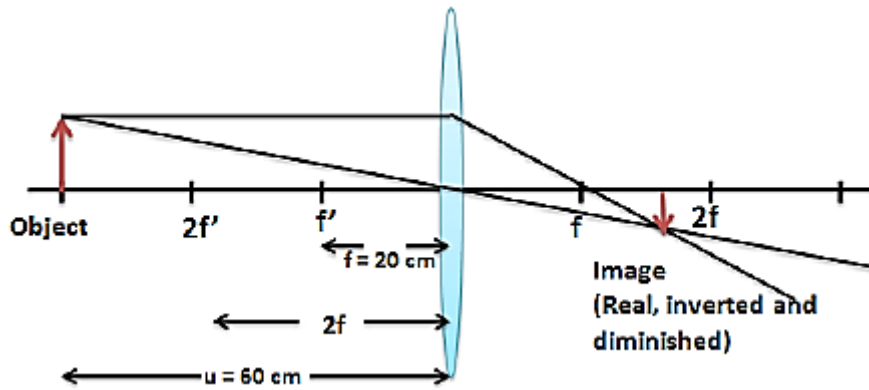
Magnification, $m = \dfrac{v}{u}$

Let us consider the third observation where

u = -40 cm and v = 40 cm

$\therefore m = \dfrac{v}{u} = \dfrac{40}{-40}$

$\therefore m = -1$

**Marks: 5**

**Question 24.** (a) If the image formed by a mirror for all position of the object placed in front of it is always diminished, erect and virtual, state the type of the mirror and also draw a ray diagram to justify your answer. Write one use such mirrors are put to and why.

(b) Define the radius of curvature of spherical mirrors. Find the nature and focal length of a spherical mirror whose radius of curvature is +24 cm.

**Solution:** (a) A convex mirror always forms a diminished, erect and virtual image of the object placed in front of it.

| Position of object | Position of image | Size of image | Nature of image |
|---|---|---|---|
| Between infinity and the pole of the mirror | Between P and F behind the mirror | Diminished | Virtual and erect |
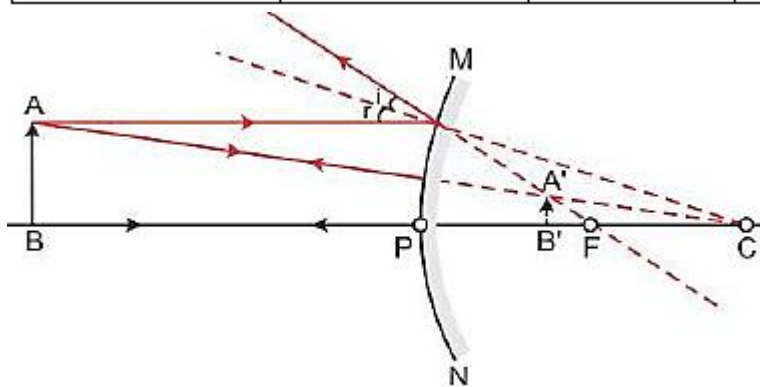


Use of a convex mirror:

i. Convex mirrors are commonly used as rear view mirrors in vehicles.

ii. They are preferred because they always give an erect image, although diminished. Also, they have a wider field of view as they are curved outwards. Thus, convex mirrors enable the driver to view a much larger area than would be possible with a plane mirror.

(b) The radius of curvature of a spherical mirror is the radius of the sphere of which the reflecting surface of the spherical mirror is a part and represented by R.

Radius of curvature R = 24 cm

Radius of curvature = 2 × focal length
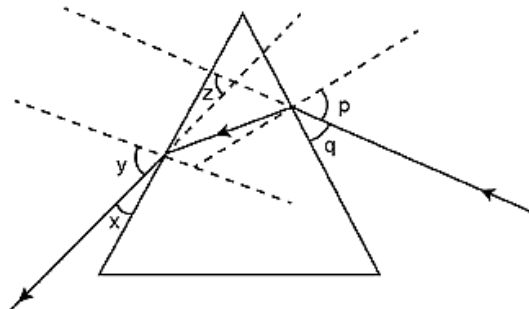
i.e., R = 2 f

24 = 2 × f

$$f = \frac{24}{2} = 12$$

f = 12 cm

**Marks: 5**

## SECTION B

**Question 25.** Study the following ray diagram:



In this diagram, the angle of incidence, the angle of emergence and the angle of deviation respectively have been represented by

(A) y, p, z

(B) x, q, z

(C) p, y, z

(D) P, z, y

**Solution:** (A) y, p, z

The angle between the incident ray and the normal is known as the angle of incidence, and the angle between the emergent ray and the normal is known as the angle of emergence. The emergent ray is bent at an angle with the direction of the incident ray. This angle is called the angle of deviation.

**Marks: 1**

**Question 26.** A student very cautiously traces the path of a ray through a glass slab for different values of the angle of incidence ($\angle i$). He then measures the corresponding values of the angle of refraction ($\angle r$) and the angle of emergence ($\angle e$) for every value of the angle of incidence. On analysing these measurements of angles, his conclusion would be

(A) $\angle i > \angle r > \angle e$

(B) $\angle i = \angle e > \angle r$

(C) $\angle i < \angle r < \angle e$

(D) $\angle i = \angle e < \angle r$

**Solution:** (B) $\angle i = \angle e > \angle r$

Because the emergent ray is parallel to the incident ray, the angle of incidence is equal to the angle of emergence. The refracted ray travels from a rarer medium to a denser medium (considering the first refraction); it bends towards the normal. Thus, the angle of incidence is greater than the angle of refraction. If we consider the second refraction, then light travels from a denser medium to a rarer medium, due to

which it bends away from the normal after refraction. So, in this case, the angle of refraction is again less than the angle of emergence.
**Marks: 1**

**Question 27.** Study the given ray diagrams and select the correct statement from the following:
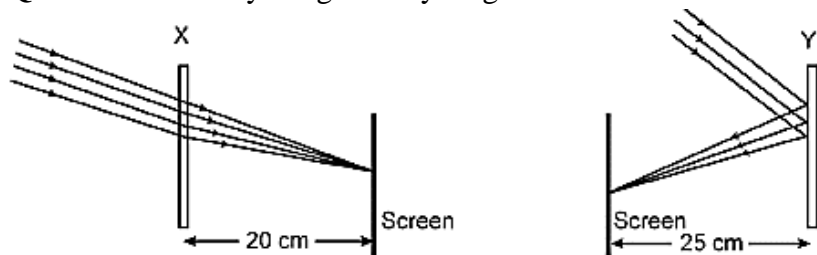


(A) Device X is a concave mirror and device Y is a convex lens, whose focal lengths are 20 cm and 25 cm respectively.
(B) Device X is a convex lens and device Y is a concave mirror, whose focal lengths are 10 cm and 25 cm respectively
(C) Device X is a concave lens and device Y is a convex mirror, whose focal lengths are 20 cm and 25 cm respectively.
(D) Device X is a convex lens and device Y is a concave mirror, whose focal lengths are 20 cm and 25 cm respectively.
**Solution:** (D) Device X is a convex lens and device Y is a concave mirror, whose focal lengths are 20 cm and 25 cm respectively.
Device X is a convex lens and device Y is a concave mirror whose focal lengths are 20 cm and 25 cm, respectively. A parallel ray of light incident on a concave mirror gets reflected, and the image is seen on a screen placed before it. A parallel ray of light incident on a convex lens converges to a point.
**Marks: 1**

**Question 28.** A student obtains a blurred image of a distant object on a screen using a convex lens. To obtain a distinct image on the screen he should move the lens.
(A) away from the screen
(B) towards the screen
(C) to a position very far away from the screen
(D) either towards or away from the screen depending upon the position of the object.
**Solution:** (B) Inverted and diminished
When the object is at infinity, the distance of the image from the lens will be equal to the focal length of the lens.
**Marks: 1**

**Question 29.** While studying the saponification reaction, what do you observe when you mix an equal amount of colorless vegetable oil and 20% aqueous solution of NaOH in a beaker?
(A) The color of the mixture has become dark brown
(B) A brisk effervescence is taking place in the beaker
(C) The outer surface of the beaker has become hot
(D) The outer surface of the beaker has become cold
**Solution:** (C) The outer surface of the beaker has become hot.

When 20% NaOH solution was added to the beaker containing vegetable oil, it was observed that the beaker's surface was warm when touched.

A whitish suspension was formed by heating the mixture of vegetable oil and 20% NaOH solution.
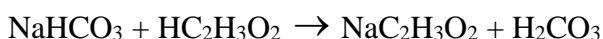
**Marks: 1**

**Question 30.** When you add a few drops of acetic acid to a test-tube containing sodium bicarbonate powder, which one of the following is your observation?

(A) No reaction takes place

(B) A colorless gas with pungent smell is released with brisk effervescence

(C) A brown colored gas is released with brisk effervescence

(D) Formation of bubbles of a colorless and odorless gas

**Solution:** (D) Formation of bubbles of a colorless and odorless gas.

$NaHCO_3 + HC_2H_3O_2 \rightarrow NaC_2H_3O_2 + H_2O + CO_2$
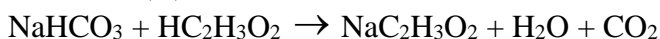
There is double displacement in which acetic acid reacts with sodium bicarbonate to form sodium acetate and carbonic acid.

$NaHCO_3 + HC_2H_3O_2 \rightarrow NaC_2H_3O_2 + H_2CO_3$

Carbonic acid is unstable and undergoes a decomposition reaction to produce carbon dioxide gas.

$H_2CO_3 \rightarrow H_2O + CO_2$
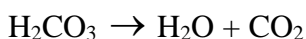
Carbon dioxide escapes from the solution as bubbles.

**Marks: 1**

**Question 31.** A student requires hard water for an experiment in his laboratory which is not available in the neighbouring area. In the laboratory there are some salts, which when dissolved in distilled water can convert it into hard water. Select from the following groups of salts, a group, each salt of which when dissolved in distilled water will make it hard.

(A) Sodium chloride, Potassium chloride

(B) Sodium sulphate, Potassium sulphate

(C) Sodium sulphate, Calcium sulphate

(D) Calcium sulphate, Calcium chloride

**Solution:** (D) Calcium sulphate, calcium chloride

Hard water can be prepared by dissolving sulphates, chlorides or bicarbonate salts of $Ca^{2+}$ or $Mg^{2+}$ ions.

**Marks: 1**

**Question 32.** To perform an experiment to identify the different parts of an embryo of a dicot seed, first of all you require a dicot seed. Select dicot seeds from the following group:

*Wheat, Gram, Maize, Pea, Barley, Ground-nut*

(A) Wheat, Gram and Pea

(B) Gram, Pea and Ground-nut

(C) Maize, Pea and Barley

(D) Gram, Maize and Ground-nut

**Solution:** (B) Gram, Groundnut, Pea

Dicot seeds have two cotyledons.

**Marks: 1**

**Question 33.** The following vegetables are kept in a basket:

*Potato, Tomato, Radish, Brinjal, Carrot, Bottle-gourd*

Which two of these vegetables correctly represent the homologous structures?

(A) Carrot and Tomato

(B) Potato and Brinjal

(C) Radish and Carrot

(D) Radish and Bottle-gourd

**Solution:** (C) Radish and Carrot

The structures which are same in structure and origin but are modified to perform different functions are called homologous structures.

Although radish and carrot store food and are used as food, the nutrients which each provide are different.

**Marks: 1**

**Question 34.** Draw in sequence (showing the four stages), the process of binary fission in Amoeba.

**Solution:** Binary fission in amoeba:
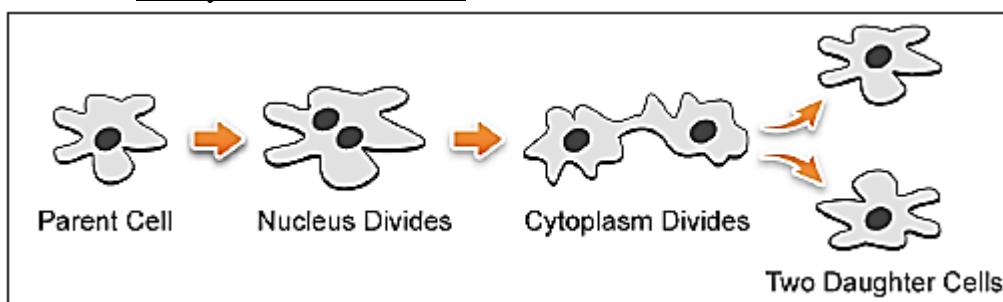


**Marks: 2**

**Question 35.** A student focuses the image of a candle flame, placed at about 2 m from a convex lens of focal length 10 cm, on a screen. After that he moves gradually the flame towards the lens and each time focuses its image on the screen.

(A) In which direction does he move the lens to focus the flame on the screen?

(B) What happens to the size of the image of the flame formed on the screen?

(C) What difference is seen in the intensity (brightness) of the image of the flame on the screen?

(D) What is seen on the screen when the flame is very close (at about 5 cm) to the lens?

**Solution:** (a) As the candle is moved towards the lens, the image distance increases. Thus, the student moves the lens away from the screen to focus the image.

(b) The size of the image increases when the object is moved towards the lens.

(c) Intensity decreases.

(d) When the candle is moved very close to the lens, no image is formed on the screen. A virtual image is formed behind the candle on the same side of the screen.

**Marks: 2**

**Question 36.** Mention the essential material (chemicals) to prepare soap in the laboratory. Describe in brief the test of determining the nature (acidic/alkaline) of the reaction mixture of saponification reaction.

**Solution:** Chemicals required: Vegetable oil, common salt and 20% sodium hydroxide solution.

When a red litmus paper is dipped in the reaction mixture, the paper changes its colour to blue. Hence, the reaction mixture of the saponification reaction is basic in nature.

**Marks: 2**