Solved Paper 2017
Science
CLASS-X

Time : 3 Hours   **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**-marks 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**-marks 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.*

Delhi Set I   **Code No. 31/1/1**

SECTION - A

1. Write the molecular formula of first two members of homologous series having functional group-Cl.   **1**

Ans. CH_3Cl, C_2H_5Cl ½ + ½
(CBSE Marking Scheme, 2017) 1

2. Name the method by which Spirogyra reproduces under favourable conditions. Is this method sexual or asexual ?   **1**

Ans. Fragmentation
    Asexual
(CBSE Marking Scheme, 2017) 1

3. What is an ecosystem ?   **1**

Ans. A unit of biosphere in which biotic and abiotic components interact with each other.
(CBSE Marking Scheme, 2017) 1

4. An object is placed at a distance of 30 cm in front of a convex mirror of focal length 15 cm. Write four characteristics of the image formed by the mirror.   **2**

Ans. Virtual, erect, diminished, laterally inverted
(CBSE Marking Scheme, 2017) 4×½

Detailed Answer:
Four properties of image formed by the given convex mirror are:
(i) Image is always erect.
(ii) Small in size

(iii) Virtual
(iv) Always form behind the mirror between focus and pole

5. What is sustainable management ? Why is reuse considered better in comparison to recycle ?   **2**

Ans. Management of resources in a way that present day needs of the population are justified as well as they remain available for future generation.   **1**
Reuse does not consume energy.   **1**
(CBSE Marking Scheme, 2017)

6. Management of forest and wild life resources is a very challenging task. Why ? Give any two reasons.   **2**

Ans. Space (Clearing forests) is needed for developmental activities.
Our selfish attitude/ No respect for natural resources.
(or same explained in any other manner)
(CBSE Marking Scheme, 2017) 2

7. Two carbon compounds X and Y have the molecular formula C_4H_8 and C_5H_{12} respectively. Which one of these is most likely to show addition reaction? Justify your answer. Also give the chemical equation to explain the process of addition reaction in this case.   **3**
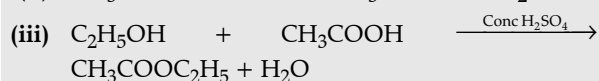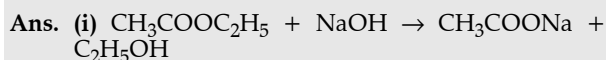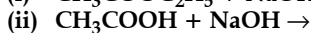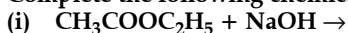
Ans. C_4H_8, it is an unsaturated hydrocarbon due to the presence of a double bond.   **1+1**

$$C_4H_8 + H_2 \xrightarrow{Ni//Pd} C_4H_{10}$$
½ Catalyst
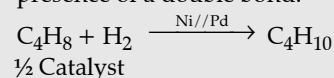
½ Equation
(or any other)
(CBSE Marking Scheme, 2017)

8. **Complete the following chemical equations :**
   (i) $CH_3COOC_2H_5 + NaOH \rightarrow$
   (ii) $CH_3COOH + NaOH \rightarrow$
   (iii) $C_2H_5OH + CH_3COOH \xrightarrow{\text{Conc. }H_2SO_4}$ 3

Ans. (i) $CH_3COOC_2H_5 + NaOH \rightarrow CH_3COONa + C_2H_5OH$

(ii) $CH_3COOH + NaOH \rightarrow CH_3COONa + H_2O$

(iii) $C_2H_5OH + CH_3COOH \xrightarrow{\text{Conc }H_2SO_4} CH_3COOC_2H_5 + H_2O$
(CBSE Marking Scheme, 2017) 1×3

* 9. **Write the names given to the vertical columns and horizontal rows in the Modern Periodic Table. How does the metallic character of elements vary on moving down a vertical column ? How does the size of atomic radius vary on moving left to right in a horizontal row ? Give reason in support of your answer in the above two cases.**   3

*10. **An element P (atomic number 20) reacts with an element Q (atomic number 17) to form a compound. Answer the following questions giving reason :**
   Write the position of P and Q in the Modern Periodic Table and the molecular formula of the compound formed when P reacts with Q.   3

11. **What happens when :**
    (i) **Accidently, *Planaria* gets cut into many pieces ?**
    (ii) ***Bryophyllum* leaf falls on the wet soil ?**
    (iii) **On maturation sporangia of *Rhizopus* bursts ?**   3

Ans.(i) Each piece regenerates into new *Planaria*   1
(ii) Bud, at its notches develop into new plants.   1
(iii) It releases spores which germinate into new mycelium in moist conditions.   1
(CBSE Marking Scheme, 2017)

12. **State the basic requirement for sexual reproduction ? Write the importance of such reproductions in nature.**   3

Ans. Formation of male and female gametes, fusion of gametes/ syngamy½ + ½
Importance – Combination of DNA from two different individuals lead to increase in genetic variation in the organism   1
This leads to diversity in the population which helps in natural selection.   1
(CBSE Marking Scheme, 2017)

13. **State the changes that take place in the uterus when:**
    (i) **Implantation of embryo has occurred.**
    (ii) **Female gamete/egg is not fertilised.**   3

Ans. (i) When implantation of embryo has occurred the uterine wall thickens and is richly supplied with blood to nourish the growing embryo.   1½

(ii) The thick and spongy lining of the uterus slowly breaks and comes out through the vagina as blood and mucus.   1½
(CBSE Marking Scheme, 2017)

14. **Distinguish between the acquired traits and the inherited traits in tabular form, giving one example for each.**   3

Ans.

	Acquired Trait	Inherited Traits
1.	Develop during one's life time	Are inherited from the parents
2.	Do not bring about changes in the DNA of the germ cells	Result due to existing changes in the DNA of the germ cells
3.	Cannot be passed on to the progeny	Can be passed on to the progeny
		1 × 2 (Any two)
	Examples	
	Acquired knowledge, loss of weight	Skin colour, colour of the eye

1
(any one) (or any other)
(CBSE Marking Scheme, 2017)

15. **Explain with the help of an example each, how the following provide evidences in favour of evolution:**
    (i) **Homologous organs**
    (ii) **Analogous organs**
    (iii) **Fossils**   3

Ans. (i) Homologous Organs: The study of these organs suggests that these organisms with organs having same structure but performing different functions have evolved from a common ancestor, *e.g.* forelimbs of different vertebrates.   1

(ii) **Analogous Organs:** The study of these apparently similar organs suggests that the organisms with apparently similar organs do not share common ancestry.   1
Similarity in these organs is superficial/ Design and the structure of these organs are very different, *e.g.* Wings of bird and wings of butterfly.

(iii) **Fossils:** Provide the missing link between the species, *e.g.* Fossils of dinosaurs with feathers/ fossils of prehistoric horse/ or any other correct example.   1
(CBSE Marking Scheme, 2017)

16. **An object 4 cm in height, is placed at 15 cm in front of a concave mirror of focal length 10 cm. At what distance from the mirror should a screen be placed to obtain a sharp image of the object. Calculate the height of the image.**   3

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* *Out of Syllabus*

Ans. $h_1 = + 4$ cm, $f = -10$ cm, $u = -15$ cm, $v = ?$, $h_2 = ?$

$$\frac{1}{f} = \frac{1}{v} + \frac{1}{u}$$ ½

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

$$\frac{1}{v} = \frac{1}{-10\,\text{cm}} - \frac{1}{-15\,\text{cm}}$$ ½
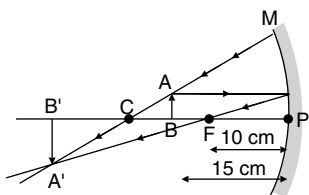
$$\therefore \qquad v = -30 \text{ cm}$$ 1

$$\frac{h_2}{h_1} = -\frac{v}{u}$$ ½

$$\therefore \qquad h_2 = -\frac{v}{u} \times h_1 = \frac{-30\,\text{cm}}{-15\,\text{cm}} \times 4 \text{ cm}$$

$$= -8 \text{ cm}$$ ½

(CBSE Marking Scheme, 2017)

Detailed Answer:

Using the mirror equation,

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

$$\Rightarrow \qquad \frac{1}{v} + \frac{1}{-15} = \frac{1}{-10}$$

$$\Rightarrow \qquad \frac{1}{v}. = \frac{1}{-10} = \frac{1}{15}$$

$$\Rightarrow \qquad \frac{1}{v} = \frac{(1-15+10)}{150}$$

$$\frac{1}{v} = \frac{-5}{150}$$

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

Thus, to obtain a sharp image of the object the screen should be placed in front of the mirror at a distance of 30 cm from the mirror.

Magnification,

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

$$m = \frac{-30}{-15} = -2$$

$$-2 = \frac{h_i}{4}$$

$$h_i = -8 \text{ cm}$$

The image height will be 8 cm.

17. Due to gradual weakening of ciliary muscles and diminishing flexibility of the eye lens a certain defect of vision arises. Write the name of this defect. Name the type of lens required by such persons to improve the vision. Explain the structure and function of such a lens.

Ans. ● Presbyopia ½
● Bifocal lens ½
● Upper portion/ part
   ➢ Concave / Diverging lens ½
   ➢ To view far off objects ½
   Lower part
   ➢ Convex/ converging lens ½
   ➢ To facilitate/ view nearby objects ½

(CBSE Marking Scheme, 2017)

18. You have been selected to talk on "ozone layer and its protection" in the school assembly on 'Environment Day'.

   (i) Why should ozone layer be protected to save the environment ?

   (ii) List any two ways that you would stress in your talk to bring in awareness amongst your fellow friends that would also help in protection of ozone layer as well as the environment. 3

Ans. (i) Because Ozone layer protects/ shields earth from harmful UV radiations of the sun 1

   (ii) ● Conducting poster making competition highlighting effects of ozone layer depletion. 1
   ● Conducting street plays highlighting the ways of environment protection. 1

(or any other)

(CBSE Marking Scheme, 2017)

19. Soaps and detergents are both types of salts. State the difference between the two. Write the mechanism of the cleansing action of soaps. Why do soaps not form lather (foam) with hard water ? Mention any two problems that arise due to the use of detergents instead of soaps. 5

Ans. ● Soaps are the sodium or potassium salts of long chain carboxylic acids while detergents are the ammonium or sulphonate salts of long chain carboxylic acids. 1
● The dirt is oily in nature and when soap is added to water, its molecules form structures called micelles in which carbon chain of the molecules dissolves in the oil while the ionic end dissolves in water and faces outside.
The micelles thus help in dissolving the dirt in water. (Note: 1 mark to be awarded if only labelled diagram of micelle is given) 2
● Ca^{2+} and Mg^{2+} present in hard water form insoluble substance (scum) with soap. 1

- **Two problems:**
  (i) Non-biodegradable
  (ii) Water pollution / soil pollution **1**
  (Note: 1 mark to be awarded for any one of the problems.)
  (CBSE Marking Scheme, 2017)

20. (i) Name the organ that produces sperms as well as secretes a hormone in human males. Name the hormone it secretes and write its functions.
(ii) Name the parts of the human female reproductive system where fertilisation occurs.
(iii) Explain how the developing embryo gets nourishment inside the mother's body. **5**

Ans. (i) ● Testes ½
● Testosterone ½
● Functions of Testosterone – Formation of sperms Development of secondary sexual characters **1**

(ii) Fallopian Tubes/ Oviduct ½

(iii) Placenta, a special disc–like tissue embedded in the mother's uterine wall and connected to the foetus/ embryo

Placenta provides a large surface area for glucose and oxygen/ nutrient to pass from the mother's blood to the developing embryo/ foetus.
(CBSE Marking Scheme, 2017) 2½

21. How do Mendel's experiments show that
(i) traits may be dominant or recessive ?
(ii) inheritance of two traits is independent of each other ? **5**

Ans. (i) Mendel conducted a Monohybrid cross/ (crossed pure tall pea plants with pure dwarf pea plants), observed only tall pea plants in the F_1 generation, but on selfing the F_1 progeny both tall and dwarf pea plants were observed in F_2 generation in the ratio 3:1. Appearance of tall character in F_1 and F_2 generations shows tallness to be a dominant character. But absence of dwarf character in F_1 and its reappearance in F_2 confirms that dwarfness is a recessive character. **2½**

(ii) Mendel conducted a dihybrid cross and observed that though he started with two types of parents, he obtained four types of individuals in F_2. The appearance of new recombination in F_2 generations along with parental type characters show that traits are inherited independently of each other. **2½**
(CBSE Marking Scheme, 2017)

22. 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	– 90	+ 18
2	– 60	+ 20
3	– 30	+ 30
4	– 20	+ 60
5	– 18	+90
6	– 10	+ 100

(i) What is the focal length of the convex lens ? Give reason in support of your answer.
(ii) Write the serial number of that observation which is not correct. How did you arrive at this conclusion ?
(iii) Take an appropriate scale to draw ray diagram for the observation at S. No. 4 and find the approximate value of magnification. **5**

Ans.(i) $f = + 15$ cm ½
Reason : Objects at S. No. (3) indicates $u = – 30$ cm, $v = + 30$ cm
Thus, object is at 2F ($2f = 30$ cm)
∴ $f = 15$ cm **1**

(ii) Observation at S. No. (6) ½
The value, $u = – 10$ cm, indicates that the object is in between the optical centre and the focus (*i.e.,* less than the focal length) of the lens and hence the image should be on the same side as the object. Thus the image distance cannot be positive. **1**

(iii) $u = – 20$cm; $v = + 60$cm; $f = + 15$ cm

1½
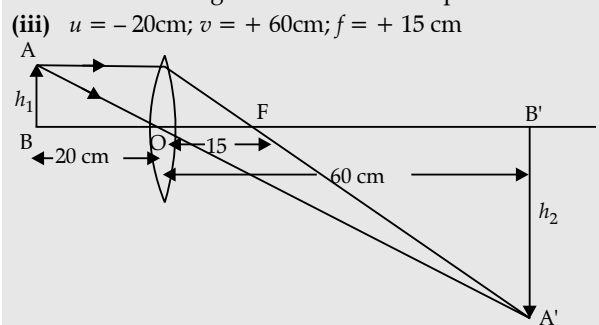
$$m = \frac{h_2}{h_1} = \frac{-4.5\,\text{cm}}{+1.5\,\text{cm}} = -3.$$ ½

(CBSE Marking Scheme, 2017)

23. (i) To construct a ray diagram we use two rays which are so chosen that it is easy to know their directions after reflection from the mirror. List two such rays and state the path of these rays after reflection in case of concave mirrors. Use these two rays and draw ray diagram to locate the image of an object placed between pole and focus of a concave mirror.

(ii) A concave mirror produces three times magnified image on a screen. If the object is placed 20 cm in front of the mirror, how far is the screen from the object ? **5**

Ans. (i) ● Listing of any two (out of four) rays and stating their path after reflection from a concave mirror.　　　　　　**1 + 1**

● Ray diagram

Using these two rays for the ray diagram when the object is in between the pole and the focus of the mirror.　　　　**1**

(ii) $u = -20$ cm,　　$m = -3$

$$m = \frac{v}{-u}$$　　　　½

$\therefore$　　$v = -m \times u$　　　　½

　　$= -(-3)(-20 \text{ cm}) = -60 \text{ cm}$　　½

Distance between the object and the screen is 40 cm

　　$= -60 \text{ cm} - (-20 \text{ cm}) = -40 \text{ cm}$　　½

**(CBSE Marking Scheme, 2017)**

Detailed Answer:

**(i) Two light rays whose path of reflection are known are:**

(a) The incident ray passes through the center of curvature: In this case, light after reflecting from the concave mirror moves back in the same path. This happens because light is incident perpendicular on the mirror surface.
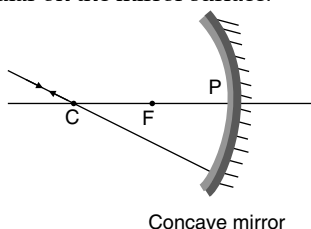
Concave mirror

(b) The ray incident obliquely to the principal axis : In this case, the incident ray will be reflected back by the reflecting surface of the concave mirror obliquely and making equal angles with the principal axis.
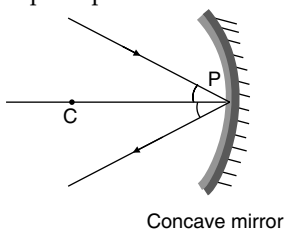
Concave mirror

Let an object is placed between the focus and pole of the concave mirror. Then using above two rays, image of the candle can be located as shown below:
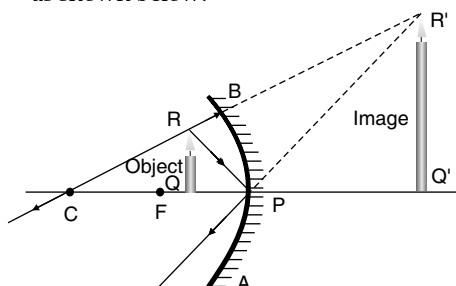
The image is formed behind the mirror. The image is virtual, erect and magnified.

(ii) Given,　　$m = -3$, $u = -20$ cm, $v = ?$

As we know,

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

$$-3 = \left(\frac{v}{-20}\right)$$

$$v = -60 \text{ cm}$$

The screen is placed in front of the mirrors at a distance of 60 cm from the pole of the mirror. Thus, the screen is placed 40 cm away from the object.

24. (i) Draw a ray diagram to explain the term angle of deviation.

(ii) Why do the component colours of incident white light split into a spectrum while passing through a glass prism, explain.

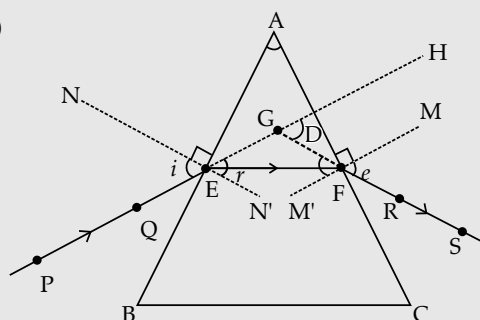**(iii) Draw a labelled ray diagram to show the formation of a rainbow.　　5**

Ans. (i)

Diagram　　　　　　　　　　　　　　**1**

Direction of rays　　　　　　　　　½

Marking $\angle$ D　　　　　　　　　½

(ii) Different colour of white light bend through different angles with respect to the incident light, as they pass through the glass prism. Thus, each colour emerges along a different path, forming a spectrum.　　　　　　　　　　　**1**
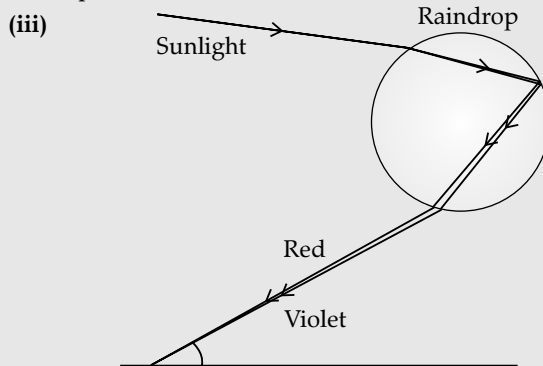
(iii)

Diagram　　　　　　　　　　　　　　**1**

Labelling　　**(CBSE Marking Scheme, 2017)** **1**

SECTION - B **

25. You have four test tubes, A, B, C and D containing sodium carbonate, sodium chloride, lime water and blue litmus solutions respectively. Out of these the material of which test tube/test tubes would be suitable for the correct test of acetic/ethanoic acid ?
    (a) only A
    (b) A and B
    (c) B and C
    (d) A and D   1

26. For demonstrating the preparation of soap in the laboratory which of the following combinations of an oil and a base would be most suitable ?
    (a) Mustard oil and calcium hydroxide
    (b) Castor oil and calcium hydroxide
    (c) Turpentine oil and sodium hydroxide
    (d) Mustard oil and sodium hydroxide   1

27. A student took four test tubes P, Q, R and S and filled about 8 ml of distilled water in each. After that he dissolved an equal amount of Na_2SO_4 in P, K_2SO_4 in Q, $CaSO_4$ in R and $MgSO_4$ in S. On adding an equal amount of soap solution and shaking each test tube well, a good amount of lather will be obtained in the test tubes :
    (a) P and Q
    (b) P and R
    (c) P, Q and S
    (d) Q, R and S   1

28. A student while observing an embryo of a gram seed listed various parts of the embryo as listed below :

    Testa, Micropyle, Cotyledon, Tegmen, Plumule, Radicle. On examining the list the teacher commented that only three parts are correct. Select these three correct parts:
    (a) Cotyledon, Testa, Plumule
    (b) Cotyledon, Plumule, Radicle
    (c) Cotyledon, Tegmen, Radicle
    (d) Cotyledon, Micropyle, Plumule   1

29. Select the set of a homologous organs from the following :
    (a) Wings of pigeon and a butterfly
    (b) Wings of bat and a pigeon
    (c) Forelimbs of cow, a duck and a lizard
    (d) Wings of butterfly and a bat   1

30. Three students A, B and C focussed a distant building on a screen with the help of a concave mirror. To determine focal length of the concave mirror they measured the distances as given below:
    Student A : From mirror to the screen
    Student B : From building to the screen
    Student C : From building to the mirror
    Who measured the focal length correctly :
    (a) Only A
    (b) Only B

** *Practical Part*

(c) A and B
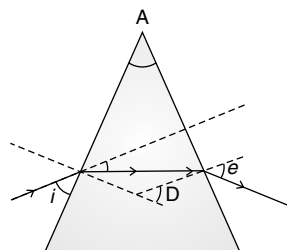(d) B and C   1

31. If you focus the image of a distant object, whose shape is given below, on a screen using a convex lens,

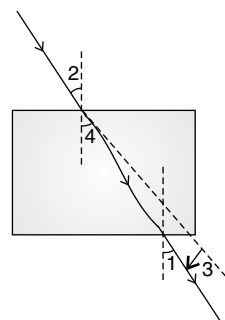   the shape of the image of this object on the screen would be :   1

    (a)

    (b)

    (c)

    (d)

32. In the following diagram the correctly marked angles are :

    (a) $\angle A$ and $\angle e$
    (b) $\angle i$, $\angle A$ and $\angle D$
    (c) $\angle A$, $\angle r$ and $\angle e$
    (d) $\angle A$, $\angle r$ and $\angle D$ 1

33. The correct sequencing of angle of incidence, angle of emergence, angle of refraction and lateral displacement shown in the following diagram by digits 1, 2, 3 and 4 is :

    (a) 2, 4, 1, 3
    (b) 2, 1, 4, 3
    (c) 1, 2, 4, 3
    (d) 2, 1, 3, 4   1

34. A gas is liberated immediately with a brisk effervescence, when you add acetic acid to sodium hydrogen carbonate powder in a test tube. Name the gas and describe the test that confirms the identity of the gas. **2**

35. Name the type of asexual reproduction in which two individuals are formed from a single parent and the parental identity is lost. Write the first step from where such a type of reproduction begins. Draw first two stages of this reproduction. **2**

36. A student places a candle flame at a distance of about 60 cm from a convex lens of focal length 10 cm and focuses the image of the flame on a screen.

After that he gradually moves the flame towards the lens and each time focuses the image on the screen.

(i) In which direction-toward or away from the lens, does he move the screen to focus the image ?

(ii) How does the size of the image change ?

(iii) How does the intensity of the image change as the flame moves towards the lens ?

(iv) Approximately for what distance between the flame and the lens, the image formed on the screen is inverted and of the same size ?

Delhi Set II   **Code No. 31/1/2**

SECTION - A

1. Write the molecular formula of first two members of homologous series having functional group -Br. **1**

Ans. CH_3Br, C_2H_5Br

         (CBSE Marking Scheme, 2017) 1

2. How does *Planaria* reproduce. Is this method sexual or asexual ? **1**

Ans. Regeneration; Asexual

         (CBSE Marking Scheme, 2017) 1

3. Why is forest considered a natural ecosystem ? **1**

Ans. Because a forest is a self-sustaining system

         (CBSE Marking Scheme, 2017) 1

4. An object is placed at a distance of 40 cm in front of a convex mirror of radius of curvature 40 cm. List four characteristics of the image formed by the mirror. **2**

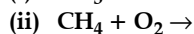**Ans.** Virtual, erect, diminished, laterally inverted

         (CBSE Marking Scheme, 2017) 4 × ½

6. Explain how would the involvement of local people be useful for successful management of forests. **2**

Ans. Local people are dependent on forest produce for various aspects of their life, therefore they develop practices to ensure that the resources are used in sustainable manner.
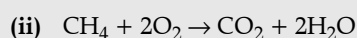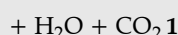
         (CBSE Marking Scheme, 2017) 2

7. Complete the following chemical equations:
   (i) $CH_3COOH + Na_2CO_3 \rightarrow$
   (ii) $CH_4 + O_2 \rightarrow$
   (iii) $C_2H_5OH + Na \rightarrow$ **3**

Ans. (i) $2CH_3COOH + Na_2CO_3 \rightarrow 2CH_3COONa$
               $+ H_2O + CO_2$ **1**

(ii) $CH_4 + 2O_2 \rightarrow CO_2 + 2H_2O$ **1**

(iii) $2C_2H_5OH + 2Na \rightarrow 2C_2H_5ONa + H_2$ **1**

         (CBSE Marking Scheme, 2017)

8. Two carbon compounds X and Y have the molecular formula C_3H_6 and C_4H_{10} respectively. Which one of the two is most likely to show addition reaction? Justify your answer. Also give the chemical equation to explain the process of addition reaction in this case. **3**

Ans. ● C_3H_6 / X **1**

● It is an unsaturated compound / due to the presence of a double bond. **1**

● $C_3H_6 + H_2 \xrightarrow{\text{Ni/Pd}} C_3H_8$ **1**
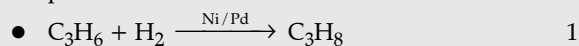
         (CBSE Marking Scheme, 2017)

11. Mention the total number of chromosomes along with the sex chromosomes that are present in a human female and a human male. Explain how in sexually producing organisms the number of chromosomes in the progeny remains the same as that of the parents. **3**

Ans. Human male – 22 pairs of chromosomes along with XY sex chromosome. ½
Human female – 22 pairs of chromosomes along with XX sex chromosomes ½
The original number of chromosomes (the amount of DNA) becomes half during gamete formation. When the gametes fuse, the original number of chromosomes (the amount of DNA) is restored in the progeny. **(CBSE Marking Scheme, 2017) 2**

14. "Natural selection and speciation leads to evolution." Justify this statement.

Ans. ● Natural selection is defined as the change in frequency of some genes in a population, which gives survival advantage to a species. **1**

● Whereas speciation is the development of a new species from pre-existing ones. **1**

● This leads to a sequence of gradual change in the primitive organisms over millions of years, to form newer species which are very different from older ones. This is called evolution. **1**

         (CBSE Marking Scheme, 2017)

16. A 3 cm tall object is placed 18 cm in front of a concave mirror of focal length 12 cm. At what distance from the mirror should a screen be placed to see a sharp image of the object on the screen. Also calculate the height of the image formed. **3**

Ans. $h_1 = +3$ cm, $f = -12$ cm, $u = -18$ cm, $v = ?$, $h_2 = ?$

$$\frac{1}{f} = \frac{1}{v} + \frac{1}{u} \qquad ½$$

$$\Rightarrow \qquad \frac{1}{v} = \frac{1}{f} - \frac{1}{u} \qquad ½$$

$$= \frac{1}{-12\text{cm}} - \frac{1}{-18\text{cm}} \qquad ½$$

$$\therefore \qquad v = -36 \text{ cm} \qquad ½$$

$$m = \frac{h_2}{h_1} = -\frac{v}{u} \qquad ½$$

$$\therefore \qquad h_2 = -\frac{v}{u} \times h_1 = \frac{-36\text{cm}}{-18\text{cm}} = -6 \text{ cm} \qquad ½$$

(CBSE Marking Scheme, 2017)

17. With the help of ciliary muscles the human eye can change its curvature and thus alter the focal length of its lens. State the changes that occur in the curvature and focal length of the eye lens while viewing (i) a distance object, (ii) nearby objects.

Explain, why a normal eye is not able to see distinctly the objects placed closer that 25 cm, without putting any strain on the eye. **3**
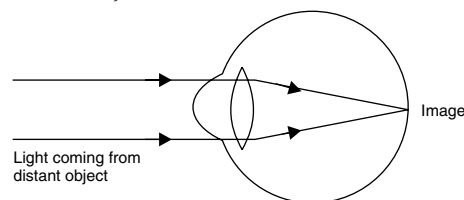
Ans. ● (a) Lens becomes thin ½
Curvature – decreases ½
Focal length – increases
(b) Curvature – increases ½
Focal length – decreases ½
● Focal length of the lens of a normal human eye cannot be decreased below a certain limit.

1

(Note: In the Hindi version instead of change in curvature, change in radius of curvature has been asked. So, for Hindi medium the correct answer is

(a) Radius of curvature – increases; focal length – increases
(b) Radius of curvature – decreases; focal length – decreases **(CBSE Marking Scheme, 2017)**

Detailed Answer:

(i) When we see distant objects, the ciliary muscles relax/expand to decrease the curvature and thereby increase the focal length of the lens. Hence, the lens becomes thin. This enables us to see the distant object clearly. Thus, the focal length of the eye lens increases while seeing distant objects.

Light coming from distant object — Image

(ii) To see the nearby objects clearly, the focal length of the lens should be shorter. For this, the ciliary muscles contract to increase the curvature and thereby decrease the focal length of the lens. Hence, the lens becomes thick. This enables you to see the nearby objects clearly.

Object — Image
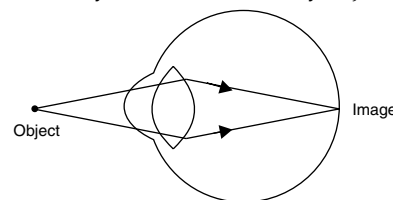
A normal eye is not able to see distinctly the objects placed closer than 25 cm, without putting any strain on the eye. This is because the ciliary muscles of eyes are unable to contract beyond a certain limit. If the objects are placed at a distance less than 25 cm from the eye, then the objects appear blurred because light rays coming from the object meet beyond the retina.

Delhi Set III   Code No. 31/1/3

SECTION - A

1. Write the molecular formula of first two members of homologous series having functional group -OH. **1**

Ans. CH_3OH, C_2H_5OH
(CBSE Marking Scheme, 2017) 1

2. How does *Plasmodium* reproduce. Is this method sexual or asexual? **1**

Ans. Multiple fission; Asexual
(CBSE Marking Scheme, 2017) 1

3. Why is a lake considered to be a natural ecosystem? **1**

Ans. Because a lake is a self-sustaining system.
(CBSE Marking Scheme, 2017) 1

4. An object is placed at a distance of 12 cm in front of a concave mirror of radius of curvature 30 cm. List four characteristics of the image formed by the mirror. **2**

Ans. Virtual, erect, diminished, laterally inverted
(CBSE Marking Scheme, 2017) 2

5. How do advantages of exploiting natural resources with short term gains in mind differ from the

advantages of managing our resources with a long-term perspective ? **2**

Ans. Former leads to huge immediate profits /selfish gains while latter leads to sustainable approach so that the resource may last for future generations too. **(CBSE Marking Scheme, 2017) 2**

6. **What is meant by wildlife ? How is it important for us ?** **2**

Ans. Wildlife – All naturally occurring plants, animals and their species which are not cultivated / domesticated / trained **1**
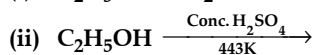
Importance:

(i) Help in maintaining ecological balance

(ii) Provide great aesthetic value for human beings

(iii) They have economical importance also
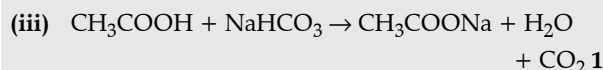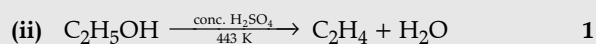
(Any two) ½ × 2

(CBSE Marking Scheme, 2017)

7. **Complete the following chemical equations :**

(i) $C_2H_5OH + O_2 \rightarrow$

(ii) $C_2H_5OH \xrightarrow[443K]{Conc. H_2SO_4}$

(iii) $CH_3COOH + NaHCO_3 \rightarrow$ **3**

Ans. (i) $C_2H_5OH + 3O_2 \rightarrow 2CO_2 + 3H_2O$ **1**

(ii) $C_2H_5OH \xrightarrow[443\,K]{conc.\,H_2SO_4} C_2H_4 + H_2O$ **1**

**(iii)** $CH_3COOH + NaHCO_3 \rightarrow CH_3COONa + H_2O + CO_2$ **1**

(CBSE Marking Scheme, 2017)

8. **The molecular formula of two carbon compounds are C_4H_8 and C_3H_8. Which one of the two is most likely to show addition reaction ? Justify your answer. Also give the chemical equation to explain the process of addition reaction in this case.** **3**

Ans. ● C_4H_8 **1**

● It is an unsaturated compound / due to the presence of a double bond. **1**

● $C_4H_8 + H_2 \xrightarrow{Ni/Pd} C_4H_{10}$ **1**
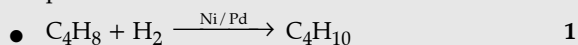
(or any other example)

(CBSE Marking Scheme, 2017)

11. **How did Mendel's experiments show that different traits are inherited independently ? Explain.** **3**

Ans. Mendel conducted a dihybrid cross; and observed that though he started with two types of parents, he obtained four types of individuals in F_2; The appearance of new recombination in F_2 generations along with parental type characters show that traits are inherited independently of each other.

(CBSE Marking Scheme, 2017) 3

Detailed Answer :

When a cross was made between a tall pea plant with round seeds and a short pea plant with wrinkled seeds, the F_1 progeny plants are all tall with round seeds. This indicates that tallness and round seeds are the dominant traits.

When the F_1 plants are self pollinated the F_2 progeny consisted of some tall plants with round seeds and some short plants with wrinkled seeds which are the parental traits.

There were also some new combinations like tall plants with wrinkled seeds and short plants with round seeds.

Thus it may be concluded that tall and short traits and round and wrinkled seed traits have been inherited independently.

14. **List any four steps involved in sexual reproduction and write its two advantages.** **3**

Ans. Steps of Sexual Reproduction :

● Formation of male and female gametes

● Transfer of male gamete to female gamete

● Fusion of gametes resulting in zygote formation

● Zygote grows into an embryo forming a new individual **½ × 4**

Advantages:

● Increases genetic variation

● Plays an important role in the origin of new species

(CBSE Marking Scheme, 2017) ½ × 2

16. **The image of a candle flame placed at a distance of 30 cm from a mirror is formed on a screen placed in front of the mirror at a distance of 60 cm from its pole. What is the nature of the mirror ? Find its focal length. If the height of the flame is 2·4 cm, find the height of its image. State whether the image formed is erect or inverted.** **3**

Ans. $h_1 = + 24$ cm, $u = -30$ cm, $v = -60$ cm, $f = ?$

$$\frac{1}{f} = \frac{1}{v} + \frac{1}{u}$$ ½

$$= \frac{1}{-60\,cm} + \frac{1}{-30\,cm}$$ ½

$\therefore \qquad f = -20$ cm ½

$$m = \frac{h_2}{h_1} = -\frac{v}{u}$$ ½

$\therefore \qquad h_2 = -h_1 \times \frac{v}{u} = -2.4$ cm $\times \frac{-60\,cm}{-30\,cm}$

$$= -4.8 \text{ cm}$$ ½

($-ve$ sign of h^2 (image size) indicate that the image is inverted) ½

(CBSE Marking Scheme, 2017)

17. **Write about power of accommodation of human eye. Explain why the image distance in the eye does not change when we change the distance of an object from the eye ?** 3

Ans. ● Ability of the eye lens to focus nearby as well as distant objects on the retina by changing the curvature / focal length of the eye lens. 1

● Image distance in the eye is the distance between the eye lens and the retina and it is fixed. 1

● As the object approaches from infinity towards the eye, the focal length of the eye lens decreases (or vice a versa) so as to maintain the same image distance. **(CBSE Marking Scheme, 2017) 1**

Outside Delhi Set I   Code No. 31/2/1

SECTION - A

1. **Write the molecular formula of the 2nd and the 3rd member of the homologous series whose first member is methane.** 1

Ans. C_2H_6, C_3H_8.
(CBSE Marking Scheme, 2017) 1

2. **When a cell reproduces, what happens to its DNA ?** 1

Ans. Creation of DNA copy / Replication / Copying of DNA.
(CBSE Marking Scheme, 2017) 1

3. **In the following food chain, 100 J of energy is available to the lion. How much energy was available to the producer ?** 1

Plants → Deer → Lion

Ans. 1000000 J.
(CBSE Marking Scheme, 2017) 1

Detailed Answer:
In a food chain 10% energy is utilized
Let x be the energy available to deer
    10% of re = 100 J, x = 1000 J
Let y be for producer
    10% of y = 1000 J
    y = 10000 J
Let z for sun
    10% z = 10,000 J
    z = 100000 J
1000000 J.

4. **An object is placed at a distance of 30 cm from a concave lens of focal length 15 cm. List four characteristics (nature, position, etc.) of the image formed by the lens.** 2

Ans. ● Virtual
● Erect
● Diminished
● On the same side as the object / or any other characteristic
(CBSE Marking Scheme, 2017) 2

5. **State two advantages of conserving (i) forests, and (ii) wild-life.** 2

Ans. ● Conserving forests helps in (i) retaining sub soil water and
(ii) checking floods / any other
● Conserving wild life helps in (i) maintaining ecological balance and (ii) protecting the nature (or any other)
(CBSE Marking Scheme, 2017) 2

6. **Explain two main advantages associated with water harvesting at the community level.**

Ans. ● Water stored during rainy season can be used as and when required by the community.
● Ground water level increases due to recharging.
(CBSE Marking Scheme, 2017) 2

7. **Write the structural formula of ethanol. What happens when it is heated with excess of conc. H_2SO_4 at 433 K ? Write the chemical equation for the reaction stating the role of conc. H_2SO_4 in this reaction.** 3

Ans.

$$H - \underset{\underset{H}{|}}{\overset{\overset{H}{|}}{C}} - \underset{\underset{H}{|}}{\overset{\overset{H}{|}}{C}} - OH$$ 1

Ethene is produced ½

$$CH_3CH_2OH \xrightarrow[\text{443 k}]{\text{Conc. } H_2SO_4} C_2H_4 + H_2O$$ 1

Conc. H_2SO_4 acts as a dehydrating agent.   ½
(CBSE Marking Scheme, 2017)

8. **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.** 3

Ans. Esterification – A process in which an alcohol and a carboxylic acid react in the presence of conc. H_2SO_4 to form an ester.   ½

$$CH_3COOH + C_2H_5OH \xrightarrow{\text{Conc. } H_2SO_4}$$
$$CH_3COOC_2H_5 + H_2O$$ ½

● Saponification – A process in which an ester reacts with sodium hydroxide to form sodium salt of an acid and alcohol / an ester reacts in the presence of an acid or a base to give back the alcohol and carboxylic acid.   ½

- $CH_3COOC_2H_5 + NaOH \longrightarrow C_2H_5OH$
  $\qquad\qquad\qquad\qquad + CH_3COONa$ ½
- Esters are used in ice creams / perfumes ½
- Saponification process is used in preparation of soap. ½
  (CBSE Marking Scheme, 2017)

* 9. Write the number of periods and groups in the Modern Periodic Table. How does the metallic character of elements vary on moving (i) from left to right in a period, and (ii) down a group ? Give reason to justify your answer. **3**

*10. Na, Mg and Al are the elements of the 3rd period of the Modern Periodic Table having group number 1, 2 and 13 respectively. Which one of these elements has the (i) highest valency, (ii) largest atomic radius, and (iii) maximum chemical reactivity ? Justify your answer stating the reason for each. **3**

11. Reproduction is one of the most important characteristics of living beings. Give three reasons in support of the statement. **3**

Ans. ● For continuation of species / perpetuation of species. **1**
- It promotes diversity of characters / helps to show the variations which enhances the survival chances. **1**
- Increases population of a species / any other answer. **1**
  (CBSE Marking Scheme, 2017)

12. What is vegetative propagation ? State two advantages and two disadvantages of this method.

Ans. ● Vegetative propagation – A process in which any vegetative part of a plant (root, stem or leaf) gives rise to a new plant under appropriate conditions.**1**
- **Two advantages :** (i) Large number of plants obtained in a short interval. (ii) Propagation of seedless plants is made possible / any other advantage. **½ + ½**
- **Two disadvantages :** (i) No genetic variations, so, less **½**
- adaptability to the environment. (ii) The disease of plants gets transferred to the offsprings. **½**
  (CBSE Marking Scheme, 2017)

13. 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 ? **3**

Ans. ● Three techniques – Barrier method, chemical method, surgical method **½ × 3**
- Chemical method **½**
- It maintains health of the woman, parents can provide more attention to children / more resources are available to the family / any other. **½ + ½**
  (CBSE Marking Scheme, 2017)

* *Out of Syllabus*

14. How did Mendel explain that it is possible that a trait is inherited but not expressed in an organism ? **3**

Ans. ● In Mendel's experiment, when pure tall pea plants were crossed with pure dwarf pea plants, only tall pea plants were obtained in F_1 generation. **1**
- On selfing the pea plants of F_1 generation both tall and dwarf pea plants were obtained in F_2 generation. **1**
- Reappearance of the dwarf pea plants in F_2 generation proves that the dwarf trait was inherited but not expressed in F_1 generation.
  Note: If explained with flow chart with proper description, full marks be awarded. **1**
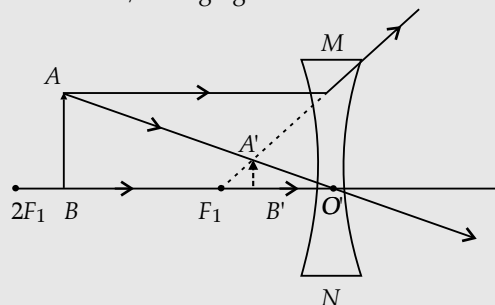 **(CBSE Marking Scheme, 2017)**

15. "Evolution and classification of organisms are interlinked." Give reasons to justify this statement. **3**

Ans. ● Different life forms have evolved during the course of evolution. Classification deals with the grouping of these life forms into groups and sub groups based on similarities and differences. **1**
- The more characteristics any two species have in common, more closely they are related. **1**
- Thus classification helps in tracing the evolutionary relationship between the two organisms. Hence, evolution and classification are interlinked. **1**
  (CBSE Marking Scheme, 2017)

16. If the image formed by a lens for all positions of an object placed in front of it is always erect and diminished, what is the nature of this lens ? Draw a ray diagram to justify your answer. If the numerical value of the power of this lens is 10 D, what is its focal length in the Cartesian system ? **3**

Ans. Concave / diverging lens. ½

Direction of rays ½
$$f = \frac{1}{P},$$ ½
$$P = -10\,D$$
$$f = \frac{1}{-10D} = -0.1\,m = -10\,cm$$ ½
(CBSE Marking Scheme, 2017)

17. State the cause of dispersion of white light by a glass prism. How did Newton, using two identical glass prisms, show that white light is made of seven colours ? Draw a ray diagram to show the path of a narrow beam of white light, through a combination of two identical prisms arranged together in inverted position with respect to each other, when it is allowed to fall obliquely on one of the faces of the first prism of the combination. **3**

Ans. Different colours of light bend through different angles with respect to the incident ray / different speed of different colours of light in glass / different values of refractive index of glass for different colours of light.

Direction of ray & labelling.
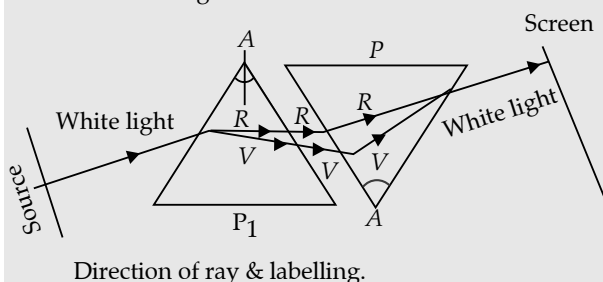
(CBSE Marking Scheme, 2017) 3

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 neighbourhood, on 'how to save water'.

(b) Name and explain any one way by which the underground water table does not go down further. **3**

Ans. (a) Two ways of creating awareness.
- Door to door campaigning
- Nukkad natak / any other method. **1 + 1**

(b) Rain water harvesting with explanation / preventing over extraction of underground water / any other method. **1**

(CBSE Marking Scheme, 2017)

Detailed Answer :

(a) Two ways to bring awareness on "how to save water" are :
   (i) By organising a demonstration of the practices in the households on how we can minimize the wastage of water.
   (ii) By organising an awareness week every year with poster competitions on "how to save water.

(b) One way by which the underground water table does not go down further is by rainwater harvesting. We can collect rainwater and store it in the form of pits and lakes ensuring that the water seeps through the soil and recharges the aquifers.

19. (a) Why are certain compounds 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.**5**

Ans.
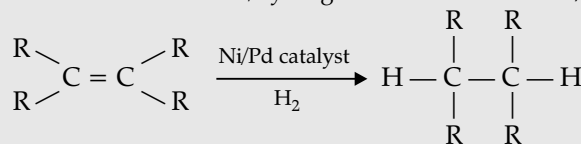- Compounds of hydrogen and carbon ½
- Alkanes – C_nH_{2n+2} ½
- Alkenes – C_nH_{2n} ½
- Alkynes – C_nH_{2n-2} ½
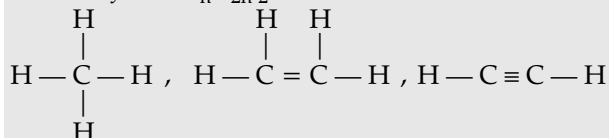
½ × 3

- Addition reaction/hydrogenation. ½

1

(CBSE Marking Scheme, 2017)

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. **5**

Ans. (a) Functions:
   (i) Ovary:
   - Production of female hormones / estrogen / progesterone
   - Production of female gamete/egg / germ cells
   ½ × 2
   (ii) Uterus:
   - Implantation of zygote / embryo
   - Nourishment of developing embryo
   ½ + ½
   (iii) Fallopian tube :
   - Transfer of female gamete from the ovary
   - Site of fertilisation ½ + ½
(b) Structure of placenta : It is a special disc like tissue embedded in mother's uterine wall and connected to the foetus / embryo. **1**

Functions of placenta : It provides a large surface area for glucose and oxygen / nutrients to pass from mother's body to the developing / developed embryo / foetus and also helps in passing the waste from the foetus / embryo to the mother's body. **1**

(CBSE Marking Scheme, 2017)

21. 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. **5**

Ans. ● **Acquired traits:** Traits which develop in the life time of an individual and do not pass to the progeny. **1**
Example- Learning a skill such as dance / music / loss of body parts / weight / any other example. **1**
● **Inherited traits:** Traits present in the gamete / germ cells which can be seen in the progeny.
Example – Skin colour / eyebrows / any other example. **1**
● **Reasons:** Traits / characteristics acquired during one's life time do not bring any change in the DNA of the reproducing cells / germ cells. **1**
Examples: Decrease in body weight of beetles due to starvation do not pass on to the next generation because there is no change in the germ cells of beetles. **1**
(CBSE Marking Scheme, 2017)

22. 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

(i) What is the focal length of the convex lens ? Give reason to justify your answer.
(ii) Write the serial number of the observation which is not correct. On what basis have you arrived at this conclusion ?
(iii) Select an appropriate scale and draw a ray diagram for the observation at S.No.2. Also find the approximate value of magnification. **5**

Ans. **(a)** f = 20 cm ½
Sl. No. 3, Since u = – 40 cm and v = +40 cm, it may be concluded that object is at 2F. **1**
(b) Sl. No. 6 ½
When u = – 15 cm, the object is between optical centre and principal focus. So image is virtual and it forms on the same side as the object. Hence, v should be – ve, but here it is + ve (+120 cm). **1**

(c)

1
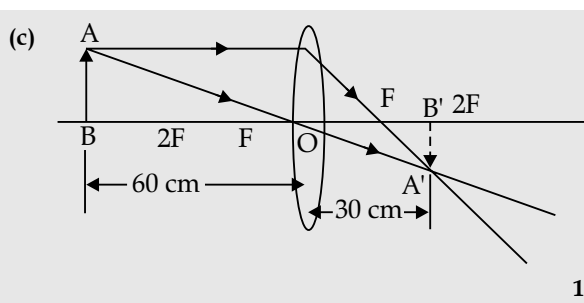
Direction of rays

Magnification, $m = \dfrac{v}{u} = \dfrac{30}{-60 \text{ cm}}$

$= 0.5 = -\dfrac{1}{2}$ **1**

(CBSE Marking Scheme, 2017)

23. **(i)** If the image formed by a mirror for all positions 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.

(ii) 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. **5**

Ans. **(i)** Convex / diverging mirror ½
Direction of rays ½
Use: As a rear view mirror / any other use ½
Reason: Always give erect and diminished image / Large field of view
(ii) The radius of the sphere of which the mirror forms a part / The distance between pole and center of curvature of a mirror. ½
Nature of the mirror – convex / diverging mirror ½
R = 2f = 24 cm ½
∴ f = +12 cm ½
(CBSE Marking Scheme, 2017)

Detailed Answer:
(i) A convex mirror forms an erect, diminished and virtual image for all the positions of the object placed in front of it.

Convex mirrors are commonly used as rear-view mirrors in vehicles as they always give an erect, though diminished image.
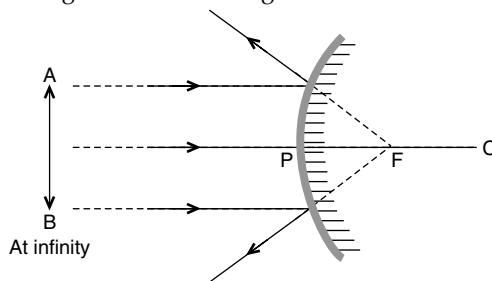
(ii) The radius of the sphere of which the reflecting surface of spherical mirror forms a part is called the radius of curvature of the mirror.

$$f = \frac{R}{2}$$

Radius of curvature, R = 24 cm

So, $\qquad f = \frac{24}{2} = 12$ cm

Thus, the focal length of a convex spherical mirror is 12 cm.

24. **(a)** A student suffering from myopia is not able to see distinctly the objects placed beyond 5 m. List two possible reasons due to which this defect of vision may have arisen. With the help of rays diagrams, explain

(i) Why the student is unable to see distinctly the objects placed beyond 5 m 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. **5**
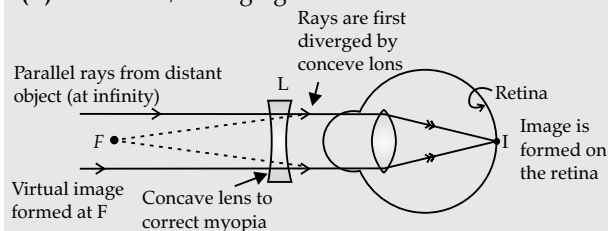
Ans. (a)
- excessive curvature of the eye lens ½
- elongation of the eyeball ½

(i)
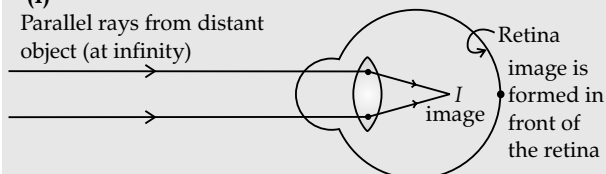
(ii) Concave / diverging lens

1

(b) $f = -5$ m (since lens is concave)

$$P = \frac{1}{f(\text{metre})}$$ ½

$$P = -0.2\,\text{D}$$ ½

(CBSE Marking Scheme, 2017)

** SECTION - B

25. 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 ? **1**

(a) No reaction takes place

(b) A colourless gas with pungent smell is released with brisk effervescence

(c) A brown coloured gas is released with brisk effervescence

(d) Formation of bubbles of a colourless and odourless gas

26. While studying the saponification reaction, what do you observe when you mix an equal amount of colourless vegetable oil and 20% aqueous solution of NaOH in a beaker ? **1**

(a) The colour 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

27. 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. **1**

(a) Sodium chloride, Potassium chloride

(b) Sodium sulphate, Potassium sulphate

(c) Sodium sulphate, Calcium sulphate

(d) Calcium sulphate, Calcium chloride

28. 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 : **1**

   Wheat, Gram, Maize, Pea, Barley, Groundnut

(a) Wheat, Gram and Pea

(b) Gram, Pea and Groundnut

(c) Maize, Pea and Barley

(d) Gram, Maize and Groundnut

29. 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 ? **1**
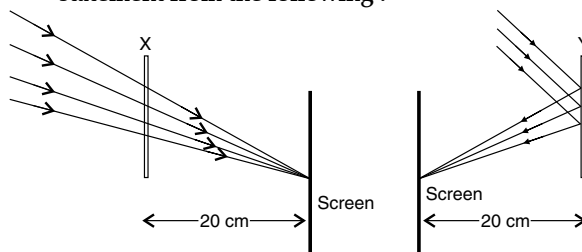
(a) Carrot and Tomato

(b) Potato and Brinjal

(c) Radish and Carrot

(d) Radish and Bottle-gourd

30. Study the given ray diagrams and select the correct statement from the following : **1**

(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.

31. 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 **1**

(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.

32. 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 **1**

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

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

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

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

33. Study the following ray diagram:
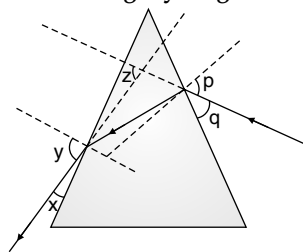
In this diagram, the angle of incidence, the angle of emergence and the angle of deviation respectively have been represented by **1**

(a) y, p, z

(b) x, q, z

(c) p, y, z

(d) p, z, y

34. 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. **2**

35. Draw in sequence (showing the four stages), the process of binary fission in Amoeba. **2**

36. 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.

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

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

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

(iv) What is seen on the screen when the flame is very close (at about 5 cm) to the lens ? **2**

Outside Delhi Set II   **Code No. 31/2**

SECTION - A

1. Write the molecular formula of the 2nd and 3rd member of the homologous series whose first member is ethene. **1**

Ans. C_3H_6, C_4H_8.
     (CBSE Marking Scheme, 2017) 1

2. Newly formed DNA copies may not be identical at times. Give one reason. **1**

Ans. If there is error in DNA copying / inaccuracies in DNA copying.
     (CBSE Marking Scheme, 2017) 1

3. In the following food chain, plants provide 500 J of energy to rats. How much energy will be available to hawks from snakes ?

     Plants → Rats → Snakes → Hawks

Ans. 5 J.   **(CBSE Marking Scheme, 2017)**

Detailed Answer:

According to 10% law – plant provide 500 J to rat, so snakes obtains 10% of 500 = 50 J

and hawk obtain 10% of 50 J = 5 J

4. An object is placed at a distance of 15 cm from a convex lens of focal length 20 cm. List four characteristics (nature, position, etc.) of the image formed by the lens. **2**

Ans. (i) Virtual

(ii) Erect

(iii) Enlarged

(iv) On the same side as the object.
     (CBSE Marking Scheme, 2017) ½ × 4

5. Why is an equitable distribution of resources essential in a society ? List two forces which are against such distribution. **2**

Ans. ● So that the resources reach every individual or has equal rights on usage of resources. ½

● It also avoids division of society / to maintain social balance / equilibrium. ½

● Forces against it – More exploitation by industrialists for developmental activities over use of resources by greedy people, black marketers. (any other) ½ + ½

(CBSE Marking Scheme, 2017)

6. Why must we conserve our forests ? List two factors responsible for causing deforestation.

2

Ans. ● Forests help in preventing soil erosion / protect biodiversity / maintain ground water level / help in rainfall / provide raw materials / prevent floods / (any other two points). ½ + ½

● Exploitation by industries / increase in population / urbanization / cattle grazing / (any other two points). ½ + ½

(CBSE Marking Scheme, 2017)

9. What happens when (write chemical equation in each case)

(i) ethanol is burnt in air ?

(ii) ethanol is heated with excess conc. H_2SO_4 at 443 K ?

(iii) a piece of sodium is dropped into ethanol ? **3**

Ans. ● $C_2H_5OH + 3O_2 \longrightarrow 2CO_2 + 3H_2O$ **1**

● $CH_3CH_2OH \xrightarrow[\Delta\ 443\ K]{Conc.\ H_2SO_4} C_2H_4 + H_2O$ **1**

● $2C_2H_5OH + 2Na \longrightarrow 2C_2H_5ONa + H_2$ **1**

(CBSE Marking Scheme, 2017)

10. Explain esterification reaction with the help of a chemical equation. Describe an activity to show esterification. **3**

Ans. ● Esterification : A process in which an alcohol and a carboxylic acid react in the presence of conc. H_2SO_4 to form an ester. ½

$CH_3COOH + C_2H_5OH \xrightarrow{Conc.\ H_2SO_4}$

$CH_3COOC_2H_5 + H_2O$ **1**
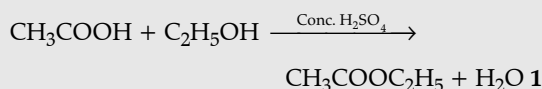
Activity :

● Take 1 mL of ethanol mixed with 1 mL of acetic acid along with few drops of conc. H_2SO_4 in a test tube.

● Warm it for 5 min. in a water bath

● Pour the contents in a beaker containing 20 – 50 mL of water and smell the resulting mixture.

● It will give a fruity smell indicating the formation of ester. **1½**

(CBSE Marking Scheme, 2017)

11. With the help of two suitable examples, explain why certain experiences and traits earned by people during their lifetime are not passed on to their next generations. When can such traits be passed on ? **3**

Ans. These are not passed because the changes do not occur in the germ cells. **1**

Example : Learning a skill such as dance / music, loss of body parts / weight / any other example. (Any two) ½ + ½

● These traits can be passed to the next generation when the changes are in the DNA of the germ cells. **1**

(CBSE Marking Scheme, 2017)

14. Describe reproduction by spores in *Rhizopus*. 3

Ans. ● Rhizopus have sporangia which contain spores/ Diagram ½, labelling ½.

● When sporangia bursts the spores are liberated out. ½

● They contain protective thick wall to tide over unfavourable conditions. ½

● On return of the favourable conditions, spores germinate to grow into rhizopus. **1**

(CBSE Marking Scheme, 2017)

Detailed Answer:

Rhizopus reproduces by spore formation which is a type of asexual reproduction. It contains tiny blob-on-a stick like structures which are involved in reproduction. The blobs are sporangia which contain spores which are covered by thick walls that protects them until they come in contact with moist surface and can begin to grow.
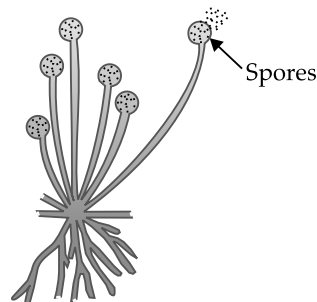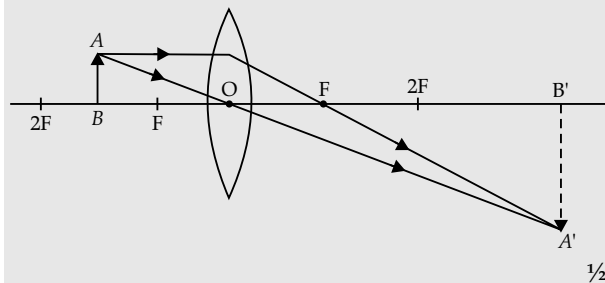

Spore formation in Rhizopus

16. Draw ray diagrams to show the formation of three times magnified (i) real, and (ii) virtual image of an object by a converging lens. Mark the positions of O, F and 2F in each diagram. **3**
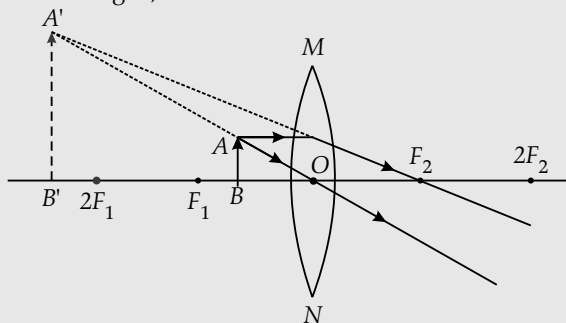
Ans.

½

Labeling O, F and 2F.**1**

½

Labelling O, F and 2F. **1**
(CBSE Marking Scheme, 2017)

17. What is 'dispersion of white light' ? State its cause. Draw a ray diagram to show the dispersion of white light by a glass prism. **3**

Ans. ● Splitting of white light into component /seven colours. **1**

● Cause – Different colours of light bend through different angles w.r.t. incident ray as they pass through prism / any other cause. **1**
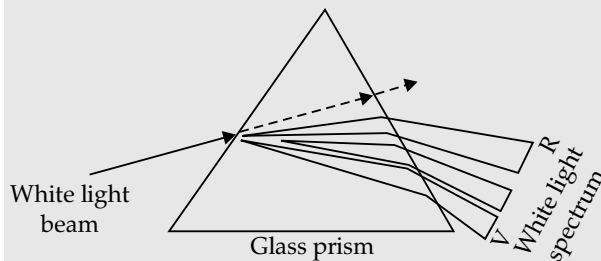
(CBSE Marking Scheme, 2017) 1

Outside Delhi Set III   Code No. 31/2/3

SECTION - A

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

Ans. C_3H_4, C_4H_6.
(CBSE Marking Scheme, 2017) 1

2. Why is variation important for a species ? **1**

Ans. Survival advantage / survival of species over time.
(CBSE Marking Scheme, 2017)1

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 → Sheep → Man **1**

Ans. 2 J.   **(CBSE Marking Scheme, 2017) 1**

Detailed Answer:

20,000 J available to the plants

$$\text{utilized } 1\% = \frac{1}{100} \times 20{,}000 = 200 \text{ J}$$

to sheep 10% of 200 J = 20 J

to man 10 % 20 J = 2 J

4. An object is placed at a distance of 15 cm from a concave lens of focal length 30 cm. List four characteristics (nature, position, etc.) of the image formed by the lens. **2**

Ans. Virtual.
● Diminished.
● Erect.
● Same side of the object / formed between F and O.
(CBSE Marking Scheme, 2017) 2

5. You being an environmentalist are interested in contributing towards the conservation of natural resources. List four activities that you can do on your own. **2**

Ans. Using public transport / limited use of fossil fuels / bicycles to go to short distances / rain water harvesting / any other activity.
(CBSE Marking Scheme, 2017) 2

6. Why are coal and petroleum categorised as natural resources ? Give a reason as to why they should be used judiciously. **2**

Ans. ● Coal and petroleum are obtained from nature. **1**
● They are non-renewable resources which cannot be renewed within a short period of time.
(CBSE Marking Scheme, 2017) 1

* **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. **3**

10. Write the electronic configuration of 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 electon-dot structure of the product and also state the nature of the bond formed between both the elements. **3**

Ans. ● X(20) – 2, 8, 8, 2   ½

- Y(17) – 2, 8, 7   ½
- XY_2 ½
- $\overset{\cdot\cdot}{X} + 2 \ \cdot\overset{\cdot\cdot}{\underset{\cdot\cdot}{Y}}: \ = X^{2+} \ [:\overset{\cdot\cdot}{\underset{\cdot\cdot}{Y}}:]^{2-}$ ½ + ½
- Ionic / electrovalent bond.   ½

(CBSE Marking Scheme, 2017)

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

Ans. ● A sequence of gradual changes which take place in the organism over millions of years resulting in the formation of new organisms / species.   **1**

- Evolution is not progress from lower form of life to higher. It has given rise to more complex body design even while simpler body designs continue to flourish.   **1**
- You may take an example of human beings who have not evolved from chimpanzees, but both have common ancestors.   **1**

(CBSE Marking Scheme, 2017)

13. List the two types of reproduction. Which one of the two is responsible for bringing in more variations in its progeny and how ?   **3**

Ans. ● Sexual reproduction, asexual reproduction   ½

- Sexual reproduction is responsible for bringing in more variations.   ½
- Because of process of DNA copying which may result in some error in it.   **1**
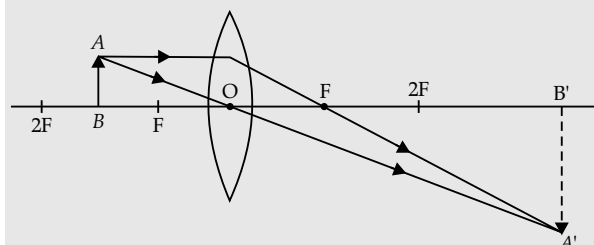- Because it involves fusion of male and female gametes from two different parents.   **1**

(CBSE Marking Scheme, 2017)

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.   **3**

Ans.
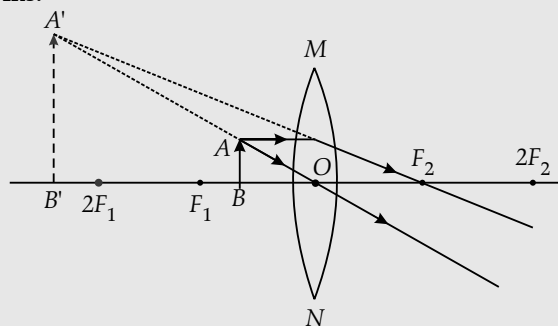
1

1

Labeling O, F and 2F.   ½
Types of lens: Convex / Converging.   ½

(CBSE Marking Scheme, 2017)

17. What is "dispersion of white light" ? Draw a labelled diagram to illustrate the recombination of the spectrum of white light. Why is it essential that the two prisms used for the purpose should be identical and placed in an inverted position with respect to each other ?   **3**

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* *Out of Syllabus*

Ans. ● Splitting of white light into seven colours.   **1**

● Because the refraction / bending produced by second prism is equal to the refraction / bending produced by the first prism.   **1**

1
(CBSE Marking Scheme, 2017)

❑❑