Solved Paper 2015
Science
CLASS-X

Time : 3 Hours   **Max. Marks : 90**

General Instructions:
 (i) *The question paper comprises of two Sections, **A** and **B**. You are to attempt both the sections.*
 (ii) *All questions are compulsory.*
 (iii) *There is no choice in any of the questions.*
 (iv) *All questions of **Section - A** and all questions of **Section - B** are to be attempted separately.*
 (v) *Question numbers **1** to **3** in **Section-A** are **one** mark questions. These are to be answered in one word or in one sentence.*
 (vi) *Question numbers **4** to **6** in **Section-A** are two marks questions. These are to be answered in about 30 words each.*
 (vii) *Question numbers **7** to **18** in **Section-A** are three marks questions. These are to be answered in about 50 words each.*
 (viii) *Question numbers **19** to **24** in **Section-A** are five marks questions. These are to be answered in about 70 words each.*
 (ix) *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.*
 (x) *Question numbers **34** to **36** in Section B are two marks questions based on practical skills. These are to be an wered in brief.*

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

SECTION - A

1. Write the name and formula of the 2nd member of homologous series having general formula C_nH_{2n}.

Ans. • Propene
   • C_3H_6

2. List two functions performed by the testis in human beings.

Ans. (a) To produce sperms
   (b) To produce male sex hormone/testosterone

3. What is the function of ozone in the upper atmosphere ?

Ans. It shields the surface of the earth from ultraviolet rays from the Sun.   **1**

4. List four characteristics of the images formed by plane mirrors.

Ans. (i) Virtual
  (ii) Erect
 (iii) Same size as the object
 (iv) As far behind the mirror as the object is in front
  (v) Laterally inverted   **(Any four)**

* 5. Why are forests considered "biodiversity hot spots"? List two ways in which an individual can contribute effectively to the management of forests and wildlife.

* 6. What is meant by "sustainable management"? Why is reuse considered better than recycling ?

7. With the help of an example, explain the process of hydrogenation. Mention the essential conditions for the reaction and state the change in physical property with the formation of the product.

Ans. Example:
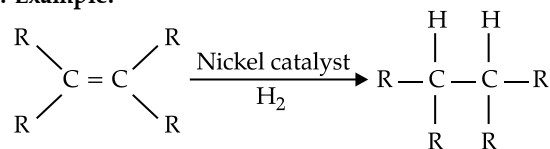
 • Addition of hydrogen to the molecule of an unsaturated hydrocarbon/compounds is hydrogenation.
 • Essential condition for hydrogenation is the presence of a catalyst like Ni/Pd / Pt.
 • Change observed in the physical property during hydrogenation is the change of the unsaturated compound from the liquid state to the corresponding saturated compound in the solid state / its boiling or melting point will increase.

8. What is the difference between the molecules of soaps and detergents, chemically? Explain the cleansing action of soaps.

Ans. • Soaps are sodium or potassium salts of long chain carboxylic acids.   ½
 • Detergents are ammonium or sulphonate salts.   ½
 • Cleansing action of soap – One part of soap molecule is ionic / hydrophilic and dissolves in water. The other part is non-ionic / carbon chain / hydrophobic part which dissolves in oil.   **1**
 • Thus, soap molecules arrange themselves in the form of a micelle / diagram of a micelle.   ½
 • On rinsing with water, soap is washed off, lifting the oily dirt particles with it.   ½

[CBSE Marking Scheme, 2015]

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* *Out of Syllabus*

Detailed Answer:

Soap is sodium or potassium salt of long chain carboxylic acid. e.g., $C_{17}H_{35}COONa^+$ while detergents are ammonium or sulphonate salts of long chain carboxylic acids.
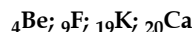
Cleansing Action of Soap: Most dirt is oily in nature. Soap molecule has ionic (hydrophilic) part and long hydrocarbon chain (hydrophobic) part. The hydrophobic end of soap molecule attaches itself with dirt and the ionic end is surrounded with molecule of water. This result in formation of a radial structure called micelles. Soap micelles helps to dissolve dirt and grease in water and cloth gets cleaned.
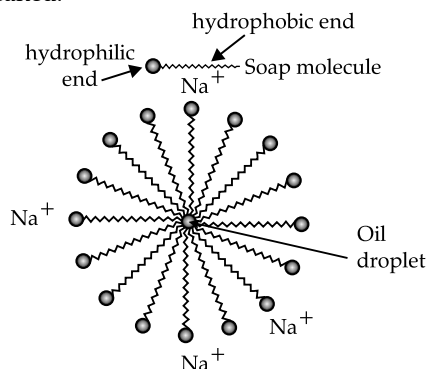
* **9. How many groups and periods are there in the modem periodic table? How do the atomic size and metallic character of elements vary as we move:**
 (a) **down a group and**
 (b) **from left to right in a period**

* **10. From the following elements:**
   $_4$**Be;** $_9$**F;** $_{19}$**K;** $_{20}$**Ca**
 (i) **Select the element having one electron in the outermost shell.**
 (ii) **two elements of the same group.**
   Write the formula of and mention the nature of the compound formed by the union of 19 K and element X(2, 8, 7)

11. What is DNA copying? State its importance.

Ans. A process where a DNA molecule produces two similar copies of itself in a reproducing cell.   **1**
Importance:
 (i) It makes possible the transmission of characters from parents to the next generation.   **1**
 (ii) It causes variation in the population.   1
   **[CBSE Marking Scheme, 2015]**

Detailed Answer:

DNA replication or DNA copying is the process of producing two identical replicas from one original DNA molecule during cell division.

*_Out of Syllabus_

Importance of DNA Copying:
 (i) DNA replication needs to occur so that during cell division, new cells will also have a copy of organism's DNA.
 (ii) DNA is necessary to make all the RNA and proteins needed for cells to carry out necessary reactions and cellular processes in order to survive.

12. Explain budding in hydra with the help of labelled diagrams only.

Ans. Budding in Hydra:
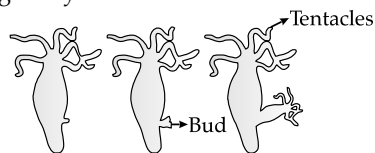
13. List any four methods of contraceptions used by humans. How does their use have a direct effect on the health and prosperity of a family.

Ans. Four methods:
 (i) Mechanical or barrier method OR Male or female condoms
 (ii) Use of hormonal preparations OR Oral Pills / i-pill / Saheli
 (iii) Use of loop or copper T OR IUCD
 (iv) Surgical method OR tubectomy / vasectomy ½×4
   Effect on health & prosperity:
 (i) Health of women is maintained
 (ii) Parents can give more attention to children
 (iii) More resources can be made available.
        (any two) ½×2
        [CBSE Marking Scheme, 2015]

Detailed Answer:
 (a) The methods of contraception used by humans are:
   (i) **Barrier method:** Physical methods such as condom, diaphragm and cervical caps are used to prevent entry of sperms in females.
   (ii) **Chemical methods:** Drugs such as oral pills and vaginal pills are used by females.
   (iii) **Intrauterine contraceptive device (IUCD):** Copper-T or loop is placed in uterus to prevent pregnancy.
   (iv) **Surgical methods** such as vasectomy in males and tubectomy in females.
   The use of these methods helps in
 (i) Controlling population explosion thus providing better living conditions.
 (ii) Keeping proper gap between siblings thus gives better health to mother as well as children.
 (iii) Preventing from STDs like AIDS, Syphilis, Gonorrhoea.   **(Any two)**

* **14. "We cannot pass on to our progeny the experiences and qualifications earned during our life time". Justify the statement giving reason and examples.**

* 15. (i) *Planaria,* insects, octopus and vertebrates all have eyes. Can we group eyes of these animals together to establish a common evolutionary origin? Justify your answer.

(ii) 'Birds have evolved from reptiles". State evidence to prove the statement.

16. To construct a ray diagram we use two rays of light which are so chosen that it is easy to determine their directions after reflection from the mirror. Choose these two rays and state the path of these rays after reflection from a concave mirror. Use these two rays to find the nature and position of the image of an object placed at a distance of 15 cm from a concave mirror of focal length 10 cm.

Ans. The candidate may choose any two of the following rays:

(i) A ray parallel to the principal axis, after reflection, will pass through the principal focus of a concave mirror.

(ii) A ray passing through the principal focus of a concave mirror after reflection will emerge parallel to the principal axis.

(iii) A ray passing through the centre of curvature of a concave mirror after reflection is reflected back along the same path.

(iv) A ray incident obliquely to the principal axis towards the pole of a concave mirror is reflected obliquely, making equal angles with the principal axis.

(Any two)
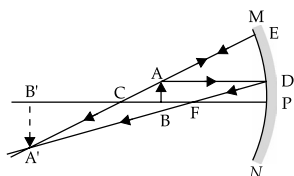
or a similar representation **1**

Note: The candidate must draw the ray diagram as per the two rays chosen by him/her. In the diagram shown above first two rays have been chosen/used.

* 17. With the help of a labelled diagram, explain why the sun appears reddish at the sun-rise and the sun-set.

18. After the examinations Rakesh with his friends went on a picnic to a nearby park. All friends carried cooked food packed in plastic bags or plastic cans. After eating the food some friends collected the leftover food and plastic bags etc and planned to dispose them off by burning. Rakesh immediately checked them and suggested to segregate the leftover food and peels of fruits from the plastic materials and respectively dispose them off separately in the green and red dustbins placed in the corner of the park.

(a) In our opinion, is burning plastic an eco-friendly method of waste disposal? Why? State the advantage of method suggested by Rakesh.

(b) How can we contribute in maintaining the parks and roads neat and clean?

* Out of Syllabus

Ans. (a) No, it pollutes air. ½, ½
Advantage:
Segregation of wastes into biodegradable and non biodegradable wastes at the initial stage of disposal saves time and energy. **1**
(b) By putting wastes in proper dustbins Or any other **1**

[CBSE Marking Scheme, 2015]

Detailed Answer:

(a) No, burning plastic is not an eco-friendly method of waste disposal because burning of plastic would produce toxic gases like ammonia, methane which cause air pollution.

Rakesh suggested to segregate the waste and dispose them separately.

The advantages of this method are:

(i) Biodegradable items which are disposed in the green dust-bin can be sent directly for composting.

(ii) Non-biodegradable items which are disposed in the red dust-bin can be sent for an appropriate reuse or recycle.

(b) We can contribute in maintaining cleanliness of the parks and roads by:

(i) Segregating the biodegradable and non-biodegradable wastes so that it can be easily disposed.

(ii) Not littering around in parks and on roads.

(iii) Re-using empty bottles, books etc. and reducing the use of non-biodegradable substances like polythene, thermocol, etc.

19. Explain why carbon forms compounds mainly by covalent bond. Explain in brief two main reasons for carbon forming a large number of compounds. Why does carbon form strong bonds with most other elements?

Ans. • Carbon has 4 electrons in its outermost shell, and needs to gain or lose 4 electrons to attain noble gas configuration. 1

• Losing or gaining 4 electrons is not possible due to energy considerations; hence it shares electrons to form covalent bonds. 1

Two reasons for large number of carbon compounds:

• **Catenation:** The unique ability of carbon to form bonds with other atoms of carbon giving rise to long chains of different types of compounds.

• **Tetravalency:** Since carbon has a valency of 4, it is capable of bonding with four other atoms of carbon or atoms of elements like oxygen, hydrogen, nitrogen, sulphur, chlorine, etc.

The reason for the formation of strong bonds by carbon is its small size which enables the nucleus to hold on to the shared pairs of electrons strongly.

20. Write the functions of the following in human female reproductive system:

Ovary, ovi duct, uterus

How does the embryo get nourishment inside the mother's body? Explain in brief.

Ans. Functions:

Ovary:

(i) Production of female hormone / oestrogen and progesterone.

(ii) Production of female gamete / egg /germ cell.

Oviduct:

(i) Transfer of female gamete from the ovary.

(ii) Site of fertilization.

Uterus:

(i) Implantation of Zygote / embryo.

(ii) Nourishment of developing embryo.

 • Placenta is 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/ nutrients to pass from the mother's blood to the embryo/ foetus.

21. **How many pairs of chromosomes are present in human beings? Out of these how many are sex chromosomes? How many types of sex chromosomes are found in human beings?**

"The sex of a newborn child is a matter of chance and none of the parents may be considered responsible for it". Draw a flow chart showing determination of sex of a newborn to justify this statement.

Ans. • 23 pairs of chromosomes   1

 • One pair, two types   ½ , ½

 • Flow Chart

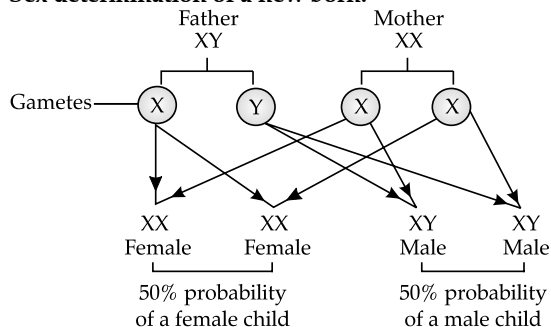   2
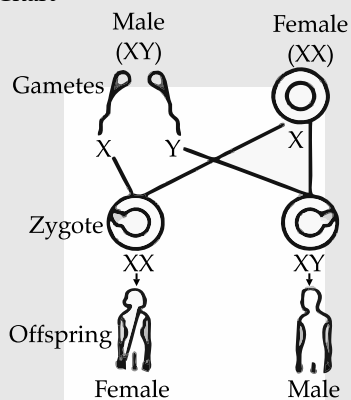
 • **Justification:** Women produce only one type of ovum / (carrying X chromosome) and males produce two types of sperms (carrying either X or Y chromosome) in equal proportions. So the sex of a child is a matter of chance depending upon the type of sperm fertilizing the ovum.   1

[CBSE Marking Scheme, 2015]

Detailed Answer:

Human beings possess 23 pairs of chromosomes. Out of these, 22 pairs are known as autosomes,while the remaining one pair comprises sex chromosomes. Human beings have two types of sex chromosomes: X and A male has one X and Y sex chromosomes (XY) while a female has two X-sex chromosomes (XX). Y.

Sex determination of a new born:

Hence, as women produce only one type of ovum carrying X chromosome and males produce two types of sperms carrying either X or Y chromosome in equal proportions. So, the sex of a child is a matter of chance depending upon the type of sperm fertilizing the ovum.

22. (a) State the laws of refraction of light. Explain the term absolute refractive index of a medium and write an expression to relate _it with the speed of light in vacuum.

(b) The absolute refractive indices of two media 'A' and 'B' are 2.0 and 1.5 respectively. If the speed of light in medium 'B' is 2×10^8 m/s, calculate the speed of light in:

(i) vacuum,

(ii) medium 'A'.

Ans. (a) Statement of laws of Refraction of light (two laws)   **1×2**

When a ray of light travels from vacuum or air into a given medium then ratio of sin i to sin r is called absolute refractive index of the medium.   ½

Absolute refractive index

$$= \frac{\text{Speed of light in vacuum}}{\text{Speed of light in the medium}} \quad ½$$

(b) $n_A = 2.0$; $n_B = 1.5$; $v_B = 2 \times 10^8$ m/s

(i) $n_B = \dfrac{c}{v_B}$ ½

∴ $c = n_B v_B$

                  $= 1.5 \times 2.10^8$ m/s   ½

                  $= 3 \times 10^8$ m/s

(ii) $n_A = \dfrac{c}{v_A}$

∴ $v_A = \dfrac{c}{n_A} = \dfrac{3 \times 10^8 \text{ m/s}}{2}$

                  $= 1.5 \times 10^8$ m/s   1

[CBSE Marking Scheme, 2015]

Detailed Answer:

(a) Laws of refraction of light:

First law: The incident ray, refracted ray and normal to the interface at the point of incidence lie in the same plane.

Second law: The sine of angle of incidence bears a constant ratio with sine of angle of refraction for a given pair of media.

$$\frac{\sin i}{\sin r} = \text{constant}$$

23. "A convex lens can form a magnified erect as well as magnified inverted image of an object placed in front of it." Draw ray diagram to justify this statement stating the position of the object with respect to the lens in each case.

An object of height 4 cm is placed at a distance of 20 cm from a concave lens of focal length 10 cm. Use lens formula to determine the position of the image formed.

Ans. • For magnified erect image – Object is between the optical centre and principal focus of a convex lens
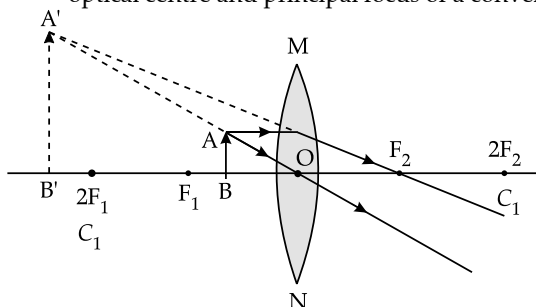
• For magnified inverted image – object between F and 2F of a convex lens
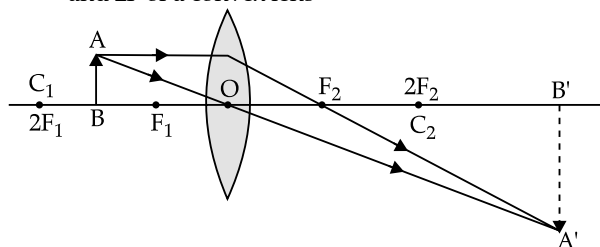
• $u = -20$ cm $f = +10$ cm $v = ?$

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

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

$$\frac{1}{v} = \frac{1}{(+10)} + \frac{1}{(-20)}$$

$$\frac{1}{v} = \frac{1}{10} - \frac{1}{20}$$

$$= \frac{+2+1}{20} = \frac{+1}{20}$$
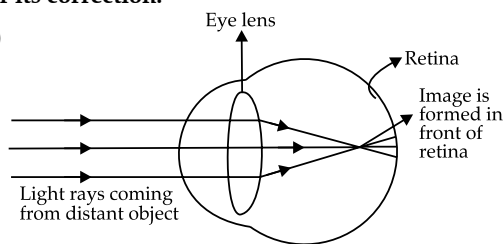
$$\therefore \quad v = \pm 20 \text{ cm}$$

** Practical Part

24. A student is unable to see clearly the words written on the blackboard placed at a distance of approximately 4 m from him. Name the defect of vision the boy is suffering from. Explain the method of correcting this defect. Draw ray diagram for the:
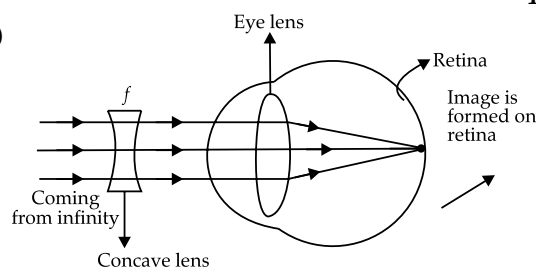
(i) defect of vision and also

(ii) for its correction.

Ans. (i)

1½

(ii)

1½

SECTION - B *

25. A student adds 2 mL of acetic acid to a test tube containing 2 mL of distilled water. He then shakes the test tube well and leaves it to settle for some time. After about 5 minutes he observes that in the test tube there is: 1

(A) a clear transparent colourless solution

(B) a clear transparent pink solution

(C) a preCipitate settling at the bottom of the test tube

(D) a layer of water over the layer of acetic acid

26. A student prepared 20% sodium hydroxide solution in a beaker to study saponification reaction . Some observations related to this are given bel ow :

(I) Sodium hydroxide solution turns red litmus blue

(II) Sodium hydroxide readily dissolves in water

(Ill) The beaker containing solution appears cold when touched from outside

(IV) The blue litmus paper turns red when dipped into the solution

The correct observations are: 1

(A) I, li and IV   (B) I, li and Ill

(C) only Ill and IV   (D) only I and II

27. Hard water is not available for an experiment. Some salts are given below:

(I) Sodium chloride   (II) Sodium sulphate

(Ill) Calcium chloride   (IV) Calcium sulphate

(V) Potassium chloride   (VI) Magnesium sulphate

Select from the following a group of these salts, each member of which may be dissolved in water to make it hard.

(A) I, II, V
(B) I, III, V
(C) III, IV, VI
(D) II, IV, VI

28. A student indentified the various parts of an embryo of a gram seed and listed them as given below:

(I) Testa
(II) Plumule
(III) Radicle
(IV) Cotyledon
(V) Tegman

Out of these the actual parts of the embryo are :

(A) I, II, III
(B) II, III, IV
(C) III, IV, V
(D) II, IV, V

* 29. Four students A, B, C and D reported the following set of organs to be homologous. Who is correct?

(A) Wings of a bat and a butterfly
(B) Wings of a pigeon and a bat
(C) Wings of a pigeon and a butterfly
(D) Forelimbs of cow, a duck and a lizard

30. Study the following diagram and select the correct statement about the device 'X':
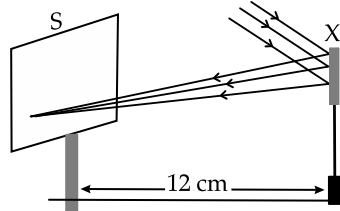
(A) Device 'X' is a concave mirror of radius of curvature 12 cm
(B) Device 'X' is a concave mirror of focal length 6 cm
(C) Device 'X' is a concave mirror of focal length 12 cm
(D) Device 'X' is a convex mirror of focal length 12 cm　　**1**

31. A student has obtained a point image of a distant object using the given convex lens. To find the focal length of the lens he should measure the distance between the:

(A) lens and the object only
(B) lens and the screen only
(C) object and the image only
(D) lens and the object and also between the object and the image　　**1**

32. Four students P, Q, R and S traced the path of a ray of light passing through a glass slab for an angle of incidence 40° and measured the angle of refraction. The values as measured them were 18°; 22°; 25° and 30° respectively. The student who has performed the experiment methodically is

(A) P
(B) Q
(C) R
(D) S　　**1**

33. After tracing the path of a ray of light through a glass prism a student marked the angle of incidence ($\angle i$), angle of refraction ($\angle r$) angle of emergence ($\angle e$) and the angle of deviation ($\angle D$) as shown in the diagram. The correctly marked angles are:
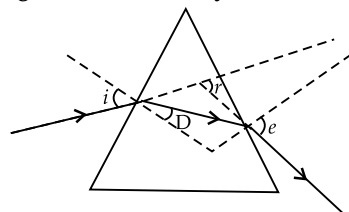
(A) $\angle i$ and $\angle r$
(B) $\angle i$ and $\angle e$
(C) $\angle i$, $\angle e$ and $\angle D$
(D) $\angle i$, $\angle r$ and $\angle e$　　**1**

34. List two observations which you make when you add a pinch of sodium hydrogen carbonate to acetic acid in a test tube. Write chemical equation for the reaction that occurs.　　**1**

35. Name the type of asexual reproduction in which two individuals are formed from a single parent and the parental identity is lost. Draw the initial and the final stages of this type of reproduction. State the event with which this reproduction starts.　　**1**

36. To find the image-distance for varying object-distances in case of a convex lens, a student obtains on a screen a sharp image of a bright object placed very far from the lens. After that he gradually moves the object towards the lens and each time focuses its image of the screen.

(a) In which direction — towards or away from the lens, does he move the screen to focus the object?
(b) What happens to the size of image — does it increase or decrease?
(c) What happen when he moves the object very close to the lens?　　**1**

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

Note: Except for the following questions all the remaining questions have been asked in previous sets.

SECTION - A

2. What is the magnification of the images formed by plane mirrors and why?　　**1**

Ans. Its magnification is +1 because plane mirror always forms image equal to object's size.

3. What meant by power of a lens?　　**1**

Ans. Power of a lens is defined as the reciprocal of focal length in meter. The degree of convergence or divergence of light rays is expressed in terms of power.

$$\text{Power} = \frac{1}{\text{Focal length (in meter)}}$$

4. Write two differences between binary fission and multiple fission in a tabular form.　　**2**

Ans.

	Binary Fission	Multiple Fission
1.	The parent body divides into two identical daughter cells.	Parent body show several nuclear divisions producing many daughter cells.
2.	2. Occurs only in favorable conditions	Occurs in either in favorable or unfavorable conditions.

*5. (a) Why do we need to manage our resources carefully? **2**

(b) Why management of natural resources requires a long term perspective ? **2**

*6. List four measures that can be taken to conserve forests. **2**

*9. What is meant by isomers? Draw the structures of two isomers of butane, C_4H_{10}. Explain why we cannot have isomers of first three members of alkane series. **3**

11. What are sexually transmitted diseases. List two example of each diseases caused due to (i) bacterial infection and (ii) viral infection. Which device or devices may be used to prevent the spread of such diseases. **3**

Ans. Sexually Transmitted Diseases (STDs) are the diseases which spread by sexual contact from an infected person to a healthy person.

(i) **Bacterial infections:** Syphilis and Gonorrhea

(ii) **Viral infections:** AIDS and Warts

Devices such as condoms, diaphragms, cervical caps can be used to prevent the spread of sexually transmitted diseases.

19. **The image of a candle flame placed at a distance of 30 cm from a spherical lens is formed on a screen placed on the other side of the lens at a distance of 60 cm from the optical centre of the lens. Identify the type of lens and calculate its focal length. If the height of the flame is 3 cm, find the height of its image. 5**

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

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

$$\frac{1}{f} = \frac{1}{60} - \frac{1}{-30}$$

$$\frac{1}{f} = \frac{+3}{60} = \frac{1}{20}$$

$$f = +20 \text{ cm}$$

As f is positive therefore, the lens is a convex lens

$$\frac{h'}{h} = \frac{v}{u}; \ h = 30 \text{ cm}$$

$$h' = \frac{v}{u} \times h$$

$$= \frac{+60 \text{ cm}}{-30 \text{ cm}} \times 3 \text{ cm}$$

$$h' = -6 \text{ cm}$$

Negative sign of h' signifies that the image is inverted. The image is two times enlarged in size than the object.

Delhi Set III — Code No. 31/1/3

Note : Except for the following questions all the remaining questions have been asked in previous sets.

SECTION - A

*2. What is speciation? **1**

3. Why should biodegradable and non-biodegradable wastes be discarded in two separate dustbins? **1**

Ans. (i) Saves time/ energy in segregation.

(ii) Biodegradable items can be sent directly for composting.

(iii) Non-biodegradable items can be sent for an appropriate reuse or recycle. **[Any two]**

4. List four specific characteristics of the images of the objects formed by convex mirrors. **2**

Ans. (i) Virtual

(ii) Erect

(iii) Smaller in size than the object

(iv) Cannot be obtained on the screen

*5. List two advantages associated with water harvesting at the community level. **2**

* 6. Everyone of us can do something to reduce our personal consumption of various natural resources. List four such activities based on 3-R approach. **2**

7. Write the name and structural formula of the compound obtained when ethanol is heated at 443 K with excess of conc. H_2SO_4. Also write chemical equation for the reaction stating the role of conc. H_2SO_4 in it. **2**

Ans. Structural formula of ethanol is: CH_3CH_2OH

When ethanol is heated with excess of conc. H_2SO_4 at 443 K, it results in the dehydration of ethanol to give ethene.

$$CH_3CH_2OH \xrightarrow[\text{Heat [443 K]}]{\text{Conc. } H_2SO_4} CH_2 = CH_2 + H_2O$$

½+½
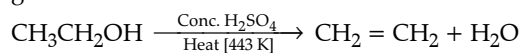
Role of conc. H_2SO_4: Conc. H_2SO_4 acts as a dehydrating agent which removes water from the ethanol

* 10. Write the number of periods the Modern Periodic Table has. State the changes in valency and metallic character of elements as we move from left to right in a period. Also state the changes, if any, in the valency and atomic size of elements as we move down a group. **3**

* Out of Syllabus

12. **(a)** Name the following:
   (i) Thread like non-reproductive structures presents in *Rhizopus.*
   (ii) 'Blobs' that develop at the tips of the non-reproductive threads in *Rhizopus*.
   (b) Explain how these structures protect themselves and what is the function of the structures released from the 'blobs' in *Rhizopus.*

Ans. **(a) (i)** Hyphae
   (ii) Sporangia
   (b) The blobs are sporangia which contain spores. When sporangia bursts the spores are liberated out which are covered by thick walls that protects them during unfavourable conditions. When the spores come in contact with moist surface, they germinate to grow into *Rhizopus*.

13. Name the parts A, B and C shown in the diagram and write their functions. **3**
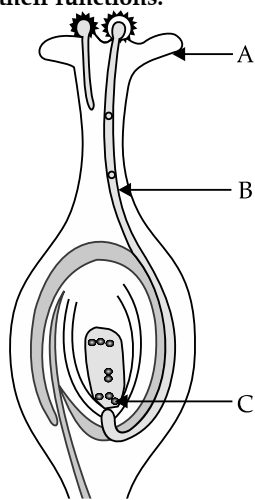
Ans. **Part A** is Stigma.
   Function: It is the terminal part of carpel, which may be sticky and helps in receiving the pollen grains from the anther of stamen during pollination.
   Part B is Pollen tube.
   Function: The pollen tube grows out of the pollen grain through the style to reach the ovary. It carries male gametes into the embryo sac in ovule.
   Part C is Female Germ Cell.
   Function: It is a female gamete which fuses with male gamete to form a diploid cell known as zygote.

* 15. List in tabular from, two distinguishing features between the acquired traits and the inherited traits with one example of each. **3**

16. To construct ray diagrams, two rays of light are generally so chosen that it is easy to determine their directions after reflection from a mirror. Choose two such rays and state the path / direction of these rays after reflection from a concave mirror. Use these two rays to find the position and nature of the image of an object placed at a distance of 8 cm from a concave mirror of focal length 12 cm. **3**

Ans. Rays which are chosen are:
   (i) A ray parallel to the principal axis, after reflection, will pass through the principal focus of a concave mirror.
   (ii) A ray passing through the principal focus of a concave mirror after reflection will emerge parallel to the principal axis.

   Path of rays after reflection:
   (i) A ray passing through the centre of curvature of a concave mirror after reflection is reflected back along the same path.
   (ii) A ray incident obliquely to the principal axis towards the pole of a concave mirror is reflected obliquely, making equal angles with the principal axis.

   $f = -12$ cm, $u = -8$ cm

   We know
   $$\frac{1}{f} = \frac{1}{v} + \frac{1}{u}$$
   $$\frac{1}{v} = \frac{1}{f} - \frac{1}{u}$$
   $$= \frac{1}{-12} - \frac{1}{(-8)}$$
   $$= \frac{1}{8} - \frac{1}{12}$$
   $$= \frac{3-2}{24}$$
   $$= \frac{1}{24} = 24 \text{ cm}$$
   $$v = +24 \text{ cm}$$

   As v is positive so image formed is virtual and is formed at a distance of 24 cm behind the mirror.

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SECTION - A

1. Write the number of covalent bonds in the molecule of ethane. **1**

Ans. Ten   [CBSE Marking Scheme, 2015] 1

2. Name the life process of an organism that helps in the growth of its population. **1**

Ans. Reproduction is the process that helps in the growth of population of an organism.

* *Out of Syllabus*

3. What will be the amount of energy available to the organisms of the 2nd trophic level of a food chain, if the energy available at the first trophic level is 10,000 joules ? **1**

Ans. According to 10% law, only 10% of energy is available to the next trophic level. So, If energy available at first trophic level is 10,000 Joules, then at second trophic level energy available will be 10% of 10,000 which equals to 1000 Joules.

4. The absolute refractive indices of glass and water are $\frac{4}{3}$ and $\frac{3}{2}$ respectively. If the speed of light in glass is 2×10^8 m/s, calculate the speed of light in (i) vacuum, (ii) water. **2**

Ans. (i) $n_g = \frac{4}{3}$; $n_w = \frac{3}{2}$; $v_g = 2 \times 10^8$ m/s

$$n_g = \frac{c}{v_g}$$ ½

∴ $$c = n_g n_g$$
$$= \frac{4}{3} \times 2 \times 10^8 \text{ m/s}$$ ½
$$= 2.67 \times 10^8 \text{ m/s}$$ **1**

Note: Full marks to be awarded for those who attempt with the correct values of refractive indices.
[CBSE Marking Scheme, 2015]

* 5. List two main causes of the pollution of water of the river Ganga. State how pollution and contamination of river water prove harmful for the health of the people of neighbouring areas. **2**

* 6. What is biodiversity ? What will happen if biodiversity of an area is not preserved ? Mention one effect of it. **2**

7. List two tests for experimentally distinguishing between an alcohol and a carboxylic acid and describe how these tests are performed. **2**

Ans. • Test 1 (Litmus Test) ½
Take two strips of blue litmus paper. Place a drop each of the alcohol and carboxylic acid on these strips separately. The blue litmus paper turns red in the case of carboxylic acid and remains unaffected in the case of alcohol.
• Test 2 (Sodium hydrogen carbonate test / sodium carbonate test) ½
A pinch of sodium hydrogen carbonate or sodium carbonate is added, to both separately. If brisk effervescence with the evolution of a colorless gas is observed, it indicates the presence of carboxylic acid.
If no change is observed then it confirms the presence of the alcohol. 1
• Test 3 – Ester test or any other suitable test(Any two)
[CBSE Marking Scheme, 2015]

8. Draw the electron-dot structure for ethyne. A mixture of ethyne and oxygen is burnt for welding. In your opinion, why cannot we use a mixture of ethyne and air for this purpose ? **3**

Ans. The electron-dot structure for ethyne(C_2H_2):
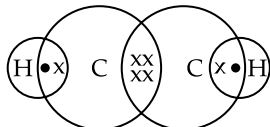
Air contains a mixture of nitrogen and oxygen. Nitrogen which is more in quantity does not support combustion. While when ethyne is burnt in oxygen, large quantity of heat and light is evolved. The heat evolved can be used for welding.

* 9. Two elements 'P' and 'Q' belong to the same period of the modern periodic table and are in Group-1 and Group-2 respectively. Compare their following characteristics in tabular form: **3**
(a) The number of electrons in their atoms
(b) The sizes of their atoms
(c) Their metallic characters
(d) Their tendencies to lose electrons
(e) The formula of their oxides
(f) The formula of their chlorides

* 10. Taking the example of an element of atomic number 16, explain how the electronic configuration of the atom of an element relates to its position in the modern periodic table and how valency of an element is calculated on the basis of its atomic number. **3**

11. List six specific characteristics of sexual reproduction. **3**

Ans. The characteristics of sexual reproduction are:
(i) Involvement of two parents
(ii) Formation of gametes through meiosis.
(iii) Transfer of male gametes into the female body.
(iv) Fusion of male and female haploid gametes. .
(v) Formation of offspring from a single celled zygote.
(vi Fusion of gametes results in genetic variations in the offspring.

12. What are chromosomes ? Explain how in sexually reproducing organisms the number of chromosomes in the progeny is maintained. **3**

Ans. Chromosomes – thread like structures made up of DNA found in the nucleus. **1**
The original number of chromosomes becomes half during gamete formation.
Hence, when the gametes combine, the original number of chromosomes gets restored in the progeny. (or same thing explained in the form of a flow chart). **1 + 1**
[CBSE Marking Scheme, 2015]

Detailed Answer:
Chromosomes are thick ribbon- like fibres located in the nucleus that carry long pieces of DNA; they are responsible for carrying the genetic characters from the parents to the offsprings.
During sexual reproduction, a female gamete or egg cell fuses with a male gamete or sperm cell which are haploid to form zygote. Zygote is diploid (2n) which contains 46 chromosomes, 23 chromosomes from mother and 23 from father. In this way, an equal genetic contribution of male and female parents is ensured in the progeny.

* Out of Syllabus

13. List four points of significance of reproductive health in a society. Name any two areas related to reproductive health which have improved over the past 50 years in our country. 3

Ans. Significance: prevent STDs,
Advantage of small family,
Less mortality among new borns,
Reduces the cases of maternal mortality. ½×4=2
Areas which have improved:
Family Planning, Decrease in STD cases (any other)
½×2=1
[CBSE Marking Scheme 2015]

* 14. Explain with an example for each, how the following provides evidences in favour of evolution in organisms: 3
 (a) Homologous organs
 (b) Analogous organs
 (c) Fossils

* 15. Explain the following: 3
 (a) Speciation
 (b) Natural Selection

16. If the image formed by a mirror for all positions of the object placed in front of it is always erect and diminished, what type of mirror is it ? Draw a ray diagram to justify your answer. Where and why do we generally use this type of mirror ? 3

Ans. Convex mirror

1

Use: As rear view mirror in vehicles/ Also in Malls, Hotels,
Airports for security reasons. ½
Why: Forms erect image, ½
Wider field of view. ½
[CBSE Marking Scheme 2015]

* 17. What is meant by scattering of light ? Use this phenomenon to explain why the clear sky appears blue or the sun appears reddish at sunrise. 3

18. Differentiate between biodegradable and non-biodegradable substances with the help of one example each. List two changes in habit that people must adopt to dispose non-biodegradable waste, for saving the environment. 3

Ans.

S. No.	Biodegradable Substance	Non-biodegradable Substance
(i)	The substance which are broken down into simpler, harmless substance in nature in due course of time by the biological processes such as action of microorganisms.	The substances which cannot be broken down into simpler, harmless substances in nature. These substances may be in solid, liquid or gaseous form and may be inert and accumulate in the environment.

* Out of Syllabus

(ii)	e.g., Domestic waste products, sewage.	e.g., DDT and poly-thene bags.

Two methods of disposal of non–biodegradable waste are:
 (i) **Recycling:** The wastes are treated and same value materials are extracted for reuse.
 (ii) **Incineration:** Medical and toxic waste are burnt at high temperature in incinerators. Incinerators transform the waste into ashes.

19. Both soap and detergent are some type of salts. What is the difference between them ? Describe in brief the cleansing action of soap. Why do soaps not form lather in hard water ? List two problems that arise due to the use of detergents instead of soaps. 5

Ans. • Soaps are sodium or potassium salts of long chain carboxylic acids. ½
 • Detergents are ammonium or sulphonate salts. ½
 • Cleansing action of soap – One part of soap molecule is ionic / hydrophilic and dissolves in water. The other part is non-ionic / carbon chain / hydrophobic part which dissolves in oil. 1
 • Thus soap molecules arrange themselves in the form of a micelle / diagram of a micelle. ½
 On rinsing with water, soap is washed off, lifting the oily dirt particles with it. ½
 Soap does not form lather in hard water because of the reaction of soap with Ca and Mg ions present in hard water which forms insoluble ppt. / scum. 1
 Problems due to the use of detergents are:
 • Detergents are non-biodegradable.
 • It leads to water or soil pollution.
 • It can also cause skin problems. **(any two)** ½×2
[CBSE Marking Scheme 2015]

Detailed Answer:
**Difference between Soap and Detergent:**

S. No.	Soap	Detergents
(i)	They are sodium or potassium salts of long chain fatty acids.	These are sodium or potassium salts of sulphonic acids of hydrocarbons.
(ii)	Soap cannot be used with hard water.	Detergents work well with hard and soft water both.
(iii)	They are fully biodegradable.	They are non-biodegradable.
(iv)	They take time to dissolve in water.	They dissolve faster in water.

Cleansing Action of Soap: When soap is dissolved in water, it forms a colloidal suspension. In this colloidal suspension, the soap molecules cluster together to form micelles and remain radially suspended in water with the hydrocarbon end towards the centre and the ionic end directed outward. The dirt particles always adhere to the oily

or greasy layer present on the skin or clothes. When a dirty cloth is dipped into a soap solution, its non-polar hydrocarbon end of micelles gets attached to the grease or oil present in dirt and polar end remains in water layer.

The mechanical action of rubbing subsequently dislodges the oily layer from the dirty surface shaping it into small globules. A stable emulsion of oil in water is formed. The emulsified oil or grease globules bearing the dirt can now be readily washed with water.
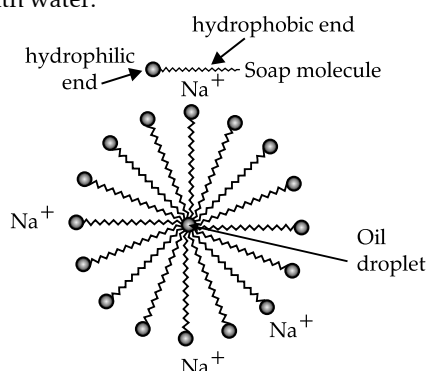
Soaps do not form lather when the water is hard. When soap is added to hard water, calcium and magnesium salts present in water displace sodium or potassium ions from the soap molecules forming an insoluble substance called scum.

Problems that aries due to use of detergents instead of soap:

(i) Detergents being non-biodegradable, they accumu¬late in the environment causing pollution.

(ii) In soil, the presence of detergents leads to pH changes making soil infertile.

(iii) The entry of detergents into food chain leads to bioaccumulation in living beings and leads to serious health issues. **(Any two)**

20. **(a) Name the human male reproductive organ that produces sperms and also secretes a hormone. Write the functions of the secreted hormone.**

(b) Name the parts of the human female reproductive system where
   (i) fertilisation takes place,
   (ii) implantation of the fertilised egg occurs.
   Explain how the embryo gets nourishment inside the mother's body. 5

Ans. (a) Testis – secrete male hormone – testosterone **1**
   Functions:
   (i) formation of sperms,
   (ii) development of secondary sexual characters.
   ½×2=1
   (b) (i) fallopian tube//oviduct.
   (ii) uterus. **½×2=1**

• Placenta is a special disc like tissue embedded in the mother's uterine wall and connected to the foetus / embryo. **1**
• Placenta provides a large surface area for glucose and oxygen/nutrients to pass from the mother's blood to the embryo/ foetus. **1**
[CBSE Marking Scheme 2015]

21. **How do Mendel's experiments show that the**
   (a) traits may be dominant or recessive,
   (b) traits are inherited independently ?

Ans. (a) Mendel conducted a Monohybrid cross/ (crossed pure tall pea plants with pure dwarf pea plants) he observed only tall pea plants in the F_1 generation, but on self crossing of 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 recessive character. **2½**

(b) 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 generation. The appearance of new recombination in F_2 generations along with parental type characters showed that traits are inherited independently of each other. **2½**

22. **What is meant by power of a lens ? Define its S.I. unit.**
   You have two lenses A and B of focal lengths +10 cm and –10 cm respectively. State the nature and power of each lens. Which of the two lenses will form a virtual and magnified image of an object placed 8 cm from the lens ? Draw a ray diagram to justify your answer. 5

Ans. • **Power of lens:** Ability of a lens to converge or diverge the light rays falling on it/The degree of convergence or divergence of light rays achieved by a lens/ Reciprocal of focal length of the lens. **1**
• **1 dioptre:** It is the power of a lens whose focal length is 1 metre. **½**
• $f_A = +10$ cm $= 0.1$ m
Converging/Convex lens **½**

$$P_A = \frac{1}{f_A}$$

$$= \frac{1}{\pm 0.1 \text{ m}} = +10D$$

$f_B = -10$ cm $= -0.1$ m **½**
Diverging/Concave lens **½**

$$P_B = \frac{1}{f_B}$$

$$= \frac{1}{-0.1 \text{ m}} = -10D$$ **½**

• In This case the object will be between the optical and principal focus of the lens. Hence the convex lens, i.e., lens A will form virtual and magnified image of the object. ½

•
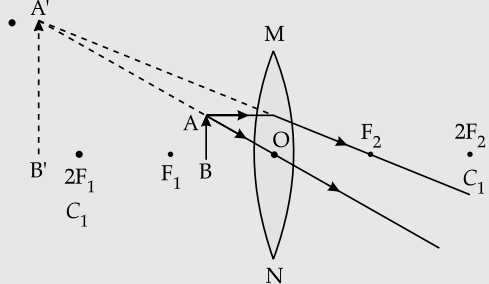
[CBSE Marking Scheme 2015]

23. One half of a convex lens of focal length 10 cm is covered with a black paper. Can such a lens produce an image of a complete object placed at a distance of 30 cm from the lens ? Draw a ray diagram to justify your answer.

A 4 cm tall object is placed perpendicular to the principal axis of a convex lens of focal length 20 cm. The distance of the object from the lens is 15 cm. Find the nature, position and size of the image. **5**

Ans. • Yes

•
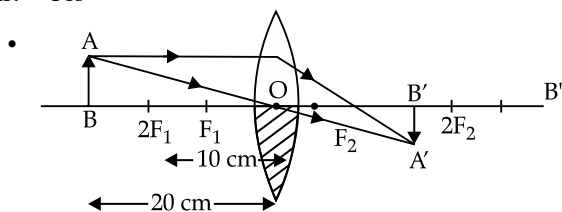
(Note: image must be between F_2 and $2F_2$)

• $h = 4$ cm, $f = +20$ cm, $u = -15$ cm, $v = ?$

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

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

$$= \frac{1}{(+20)} + \frac{1}{(-15)}$$

$$= \frac{3-4}{60} = \frac{-1}{60}$$

∴ $$v = -60 \text{ cm}$$

Nature – Virtual, erect

$$h' = \frac{v}{u} \times h$$

$$= \frac{-60 \text{ cm}}{-15 \text{ cm}}$$

$$= +16 \text{ cm}$$

24. Write the importance of ciliary muscles in the human eye. Name the defect of vision that arises due to gradual weakening of the ciliary muscles in old age. What type of lenses are required by the persons suffering from this defect to see the objects clearly ?

_____
*** Practical Part*

Akshay, sitting in the last row in his class, could not see clearly the words written on the blackboard. When the teacher noticed it, he announced if any student sitting in the front row could volunteer to exchange his seat with Akshay. Salman immediately agreed to exchange his seat with Akshay. He could now see the words written on the blackboard clearly. The teacher thought it fit to send the message to Akshay's parents advising them to get his eyesight checked.

In the context of the above event, answer the following questions:

(a) Which defect of vision is Akshay suffering from ? Which type of lens is used to correct this defect ?

(b) State the values displayed by the teacher and Salman.

(c) In your opinion, in what way can Akshay express his gratitude towards the teacher and Salman ? **5**

Ans. • Ciliary muscles modify the curvature of the eye lens to enable the eye to focus objects at varying distances/ help in adjusting the focal length of the eye lens

• Presbyopia

• Bifocal lens

(a) Defect: Myopia/ Nearsightedness

Corrective lens: Concave/ Diverging lens

(b) Values: Concerned, Caring etc. (one value of teacher, one value of Salman)

(c) By thanking the teacher and Salman

SECTION - B**

25. What do we observe on pouring acetic acid on red and blue litmus papers ? **1**

(A) Red litmus remains red and blue litmus turns red.

(B) Red litmus turns blue and blue litmus remains blue.

(C) Red litmus turns blue and blue litmus turns red.

(D) Red litmus becomes colourless and blue litmus remains blue.

26. While preparing soap a small quantity of common salt is generally added to the reaction mixture of vegetable oil and sodium hydroxide. Which one of the following may be the purpose of adding common salt ? **1**

(A) To reduce the basic nature of the soap

(B) To make the soap neutral

(C) To enhance the cleansing power of the soap

(D) To favour the precipitation of the soap

27. A student takes about 4 mL of distilled water in four test tubes marked P, Q, R and S. He then dissolves in each test tube an equal amount of one salt in one test tube, namely sodium sulphate in P, potassium sulphate in Q, calcium sulphate in R and magnesium sulphate in S. After that he

adds an equal amount of soap solution in each test tube. On shaking each of these test tubes well, he observes a good amount of lather (foam) in the test tubes marked

(A) P and Q (B) Q and R

(C) P, Q and S (D) P, R and S 1

28. **A student was asked to observe and identify the various parts of an embryo of a red kidney bean seed. He identified the parts and listed them as under:** 1

I. Tegmen

II. Testa

III. Cotyledon

IV. Radicle

V. Plumule

The correctly identified parts among these are

(A) I, II and III (B) II, III and IV

(C) III, IV and V (D) I, III, IV and V

29. **Given below is the list of vegetables available in the market. Select from these the two vegetables having homologous structures:** 1

Potato, sweet potato, ginger, radish, tomato, carrot, okra (Lady's finger)

(A) Potato and sweet potato

(B) Radish and carrot

(C) Okra and sweet potato

(D) Potato and tomato

30. **A student obtains a sharp image of the distant window (W) of the school laboratory on the screen (S) using the given concave mirror (M) to determine its focal length. Which of the following distances should he measure to get the focal length of the mirror ?** 1
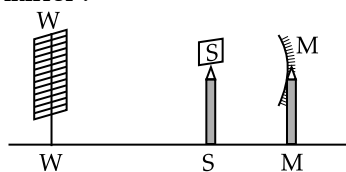
(A) MW (B) MS

(C) SW (D) MW – MS

31. **A student used a device (X) to obtain/focus the image of a well illuminated distant building on a screen (S) as shown below in the diagram. Select the correct statement about the device (X).** 1
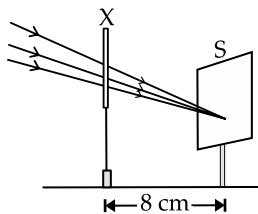
(A) This device is a concave lens of focal length 8 cm.

(B) This device is a convex mirror of focal length 8 cm.

(C) This device is a convex lens of focal length 4 cm.

(D) This device is a convex lens of focal length 8 cm.

32. **A student traces the path of a ray of light through a rectangular glass slab for the different values of angle of incidence. He observes all possible precautions at each step of the experiment. At the end of the experiment, on analysing the measurements, which of the following conclusions is he likely to draw ?** 1

(A) $\angle i = \angle e < \angle r$ (B) $\angle i < \angle e < \angle r$

(C) $\angle i > \angle e > \angle r$ (D) $\angle i = \angle e > \angle r$

33. **A student traces the path of a ray of light through a triangular glass prism for different values of angle of incidence. On analysing the ray diagrams, which one of the following conclusions is he likely to draw ?** 1

(A) The emergent ray is parallel to the incident ray.

(B) The emergent ray bends at an angle to the direction of the incident ray.

(C) The emergent ray and the refracted ray are at right angles to each other.

(D) The emergent ray is perpendicular to the incident ray.

34. **When you add sodium hydrogen carbonate to acetic acid in a test tube, a gas liberates immediately with a brisk effervescence. Name this gas. Describe the method of testing this gas.** 2

35. **Students were asked to observe the permanent slides showing different stages of budding in yeast under high power of a microscope.** 2

(a) **Which adjustment screw (coarse/fine) were you asked to move to focus the slides ?**

(b) **Draw three diagrams in correct sequence showing budding in yeast.**

36. **A 4 cm tall object is placed on the principal axis of a convex lens. The distance of the object from the optical centre of the lens is 12 cm and its sharp image is formed at a distance of 24 cm from it on a screen on the other side of the lens. If the object is now moved a little away from the lens, in which way (towards the lens or away from the lens) will he have to move the screen to get a sharp image of the object on it again ? How will the magnification of the image be affected ?** 2

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2. Where is DNA found in a cell ? 1

Ans. Genes / Chromosomes 1
[CBSE Marking Scheme 2015]

3. The first trophic level in a food chain is always a green plant. Why ? 1

Ans. Because only plants can utilize the radiant energy of the sun and transform it to chemical form during photosynthesis. 1
[CBSE Marking Scheme 2015]

5. We often observe domestic waste decomposing in the bylanes of our homes. List four ways to make the residents aware that improper disposal of wastes is harmful to the environment and also for their own health. 2

Ans. Spreading awareness / different ways to make people realize:
(a) Organizing street plays,
(b) Distributing pamphlets to the residents,
(c) Reuse / recycle of the waste products,
(d) Calling meeting of residents, welfare society / association of the locality,
(e) Advertisements through TV / radio,
(f) Putting posters / hoardings,
(g) Segregation of the wastes as per the nature of the waste.
Or any other (any two)
[CBSE Marking Scheme 2015] ½×4=2

* 6. List any two advantages associated with water stored in the ground. 2

7. What is meant by homologous series of carbon compounds ? Classify the following carbon compounds into two homologous series and name them.
C_3H_4, C_3H_6, C_4H_6, C_4H_8, C_5H_8, C_5H_{10}. 3

Ans. A group of organic compounds having the same functional group and similar structures in which the successive members differ by CH_2 group. 1
C_3H_4, C_4H_6, C_5H_8 : Alkynes ½ + ½
C_3H_6, C_4H_8, C_5H_{10} : Alkenes ½ + ½
[CBSE Marking Scheme 2015]

* 9. The elements $_4$Be, $_{12}$Mg and $_{20}$Ca, each having two valences eliminator in their valence shells, are in periods 2, 3 and 4 respectively of the modern periodic table. Answer the following questions associated with these elements, given reason in each case. 3
(a) In which group should they be ?
(b) Which one of the them is least reactive ?
(c) Which one of them has the largest atomic size ?

**11. List three distinguish features between sexual and** asexual types of reproduction, in tabular from.

Ans.

	Sexual reproduction	Asexual reproduction
(i)	Involves two parents – male and female.	Involves only one parent.
(ii)	Involves two parents – male and female.	No gametes are produced
(iii)	Fertilization/zygote formation is observed.	No fertilization / zygote formation is observed
(iv)	Meiosis occurs during gamete formation.	Meiosis does not occur at any stage of reproduction.
(v)	Genetic variation occurs.	Genetic variation does not occur.

(Any three) 1+1+1
[CBSE Marking Scheme 2015]

14. A pea plant with blue colour flower denoted by BB is cross-breed with a pea plant with white flower denoted by ww.
(a) What is the expected colour of the flower is their F_1 progeny ?
(b) What will be the percentage of plants bearing white flower in F_2 generation, when the flower of F_1 plants were selfed ?
(c) State the expected ratio of the genotype BB and Bw in the F_2 progeny. 1

Ans. (a) F_1 generation – blue 1
(b) 25% 1
(c) BB : Bw = 1 : 21 **[CBSE Marking Scheme 2015]**

Detailed Answer:
The cross can be represented as:
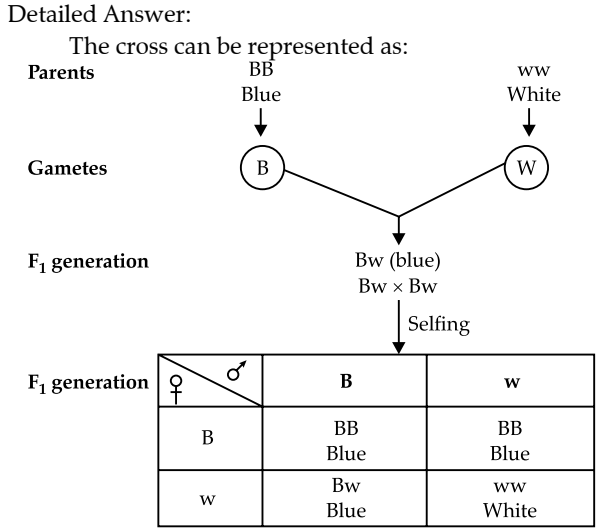
(a) The color of flowers in F_1 progeny is blue.
(b) The phenotypic ratio of blue and white flowers in

_____
* *Out of Syllabus*

F$_2$ generation is 3 : 1. Thus, the percentage of plants bearing white flowers in F$_2$ generation = $\frac{1}{4} \times 100$

= 25%

(c) The ratio of the genotypes BB and Bb in the F$_2$ generation is 1(BB) : 2 (Bb).

18. What is an ecosystem ? List its two main components. We do not clean natural ponds or lakes but an aquarium needs to be cleaned regularly. Why is it so ? Explain. 3

Ans. Ecosystem: An ecosystem is defined as a dynamic system of biotic and abiotic components and there is a continuous flow of energy between the different components. **1**

(a) Biotic component / living organisms ½

(b) Abiotic component / physical factors ½

Cleaning of aquarium: because of the,

(a) absence of natural decomposers ½

(b) stagnancy of water. ½

* **19. What are fossils ? How are they formed ? Describe in brief methods of determining the age of fossils. State any one role of fossils in the study of the process of evolution. 3**
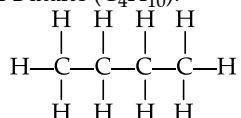

Outside Delhi Set III   Code No. 31/3

1. Write the number of covalent bonds in the molecule of butane, C$_4$H$_{10}$.

Ans. Thirteen **1**
[CBSE Marking Scheme, 2015]

Detailed Answer:

Structure of Butane (C$_4$H$_{10}$):

$$\begin{array}{c} \text{H} \quad \text{H} \quad \text{H} \quad \text{H} \\ | \quad\quad | \quad\quad | \quad\quad | \\ \text{H—C—C—C—C—H} \\ | \quad\quad | \quad\quad | \quad\quad | \\ \text{H} \quad \text{H} \quad \text{H} \quad \text{H} \end{array}$$

Thus, the number of covalent bonds in the molecule of butane is 13.

2. Name two simple organisms having the ability of regeneration.

Ans. *Planaria* and *Hydra.* ½ + ½
**[CBSE Marking Scheme, 2015]**

3. Which of the following are always at the second trophic level of food chains ? 1

Carnivores, Autotrophs, Herbivores

Ans. Herbivores are at the second trophic level.

4. Draw a ray diagram to show the path of the reflected ray corresponding to an incident ray of light parallel to the principal axis of a convex mirror and show the angle of incidence and angle of reflection on it. 2

Ans. i = angle of incidence, r = angle of reflection
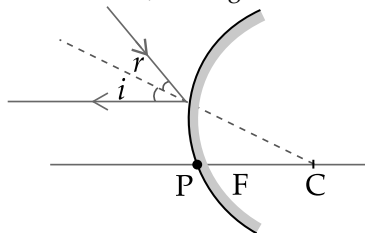
* **5. Why is sustainable management of natural resources necessary ? Out of the two – reuse and recycle – which, in your opinion, is better to practise ? Give reason. 2**

7. Write the name and general formula of a chain of hydrocarbons in which an addition reaction with hydrogen is possible. State the essential condition for an addition reaction. Stating this condition, write a chemical equation giving the name of the reactant and the product of the reaction. 3

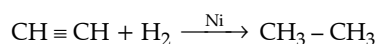**Ans.** A chain of hydrocarbons in which an addition reaction with hydrogen is possible are:

Alkene(C$_n$H$_{2n}$) and Alkyne (C$_n$H$_{2n-2}$)

The essential condition for an addition reaction is, there must be unsaturation present in the compound that is, the compound must contain double or triple bonds.

Reaction of alkene:

$$CH_2 = CH_2 + 2H_2 \xrightarrow[\text{Catalyst}]{\text{Ni}} CH_3 - CH_3$$

Ethene   Ethane
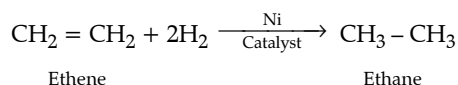
Reaction of alkyne:

$$CH \equiv CH + H_2 \xrightarrow{\text{Ni}} CH_3 - CH_3$$

The conditions which are necessary for above reactions are: addition of hydrogen molecule (s), the presence of a catalyst Nickle and the temperature should be 423K

* **9. Given below are some elements of the modern periodic table. Atomic number of the element is given in the parentheses:**

A(4), B(9), C(14), D(19), E(20) 3

(a) Select the element that has one electron in the outermost shell. Also write the electronic configuration of this element.

(b) Which two elements amongst these belong to the same group ? Give reason for your answer.

(c) Which two elements amongst these belong to the same period ? Which one of the two has bigger atomic radius ?

11. Identify A, B and C in the given diagram and write one function of each. 3
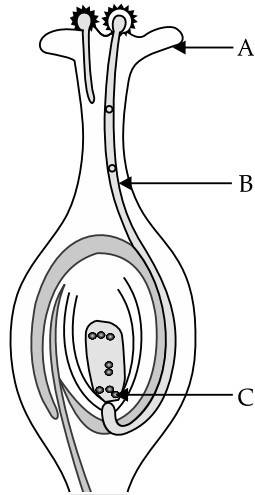
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* *Out of Syllabus*

Ans. Part A is Stigma.

Function: It is the terminal part of carpel, which may be sticky and helps in receiving the pollen grains from the anther of stamen during pollination.

Part B is Pollen tube.

Function: The pollen tube grows out of the pollen grain through the style to reach the ovary. It carries male gametes into the embryo sac in ovule.

Part C is Female Germ Cell.

Function: It is a female gamete which fuses with male gamete to form a diploid cell known as zygote.

12. **List four categories of contraceptive methods. State in brief two advantages of adopting such preventive methods.** 3

Ans. The four categories of contraceptive methods are:

(i) Physical methods e.g. condoms, cervical caps.

(ii) Chemical methods e.g. oral pills

(iii) Intrauterine contraceptive device (IUCD) e.g. Copper-T or loop.

(iv) Surgical methods e.g. vasectomy and tubectomy.

Advantages:

(a) Helps in maintaining health of a women as unwanted/undesirable pregnancies can be avoided by their use.

(b) Use of physical device like condom, prevents transmission of sexually transmitted diseases (STD's)

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* *Out of Syllabus*