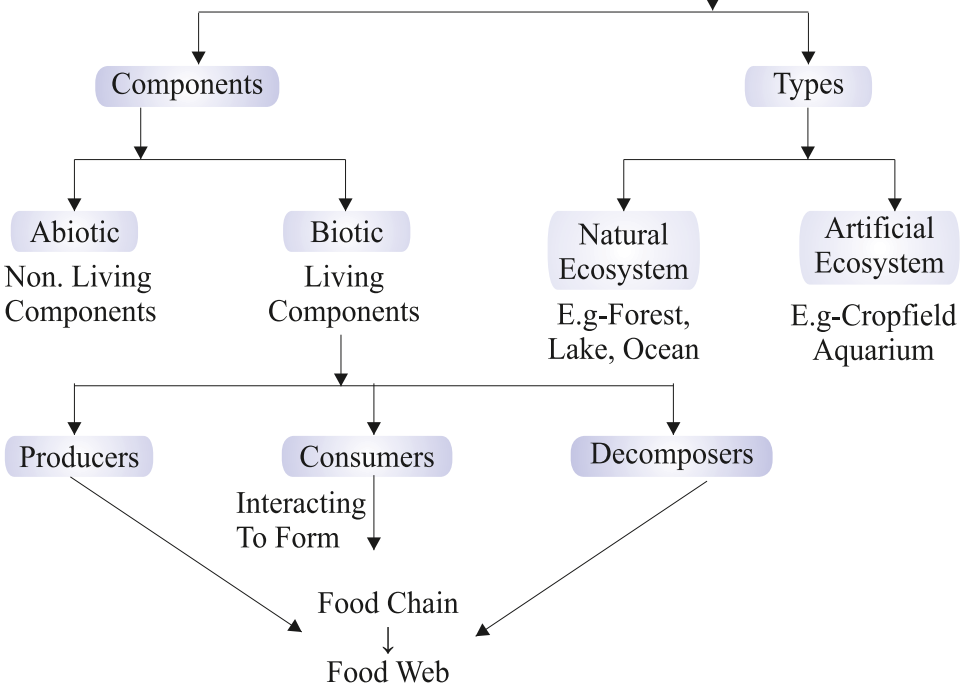
Chapter - 13

Our Environment



- Everything that surrounds us is environment. It includes both living (biotic) and non-living (abiotic) components.
- Interaction between these biotic and abiotic components form an ecosystem.
- In an ecosystem living components depend on each other for their food which give rise to food chains and food webs in nature.
- Human activities lead to environmental problems such as depletion of ozone layer and production of huge amount of garbage.

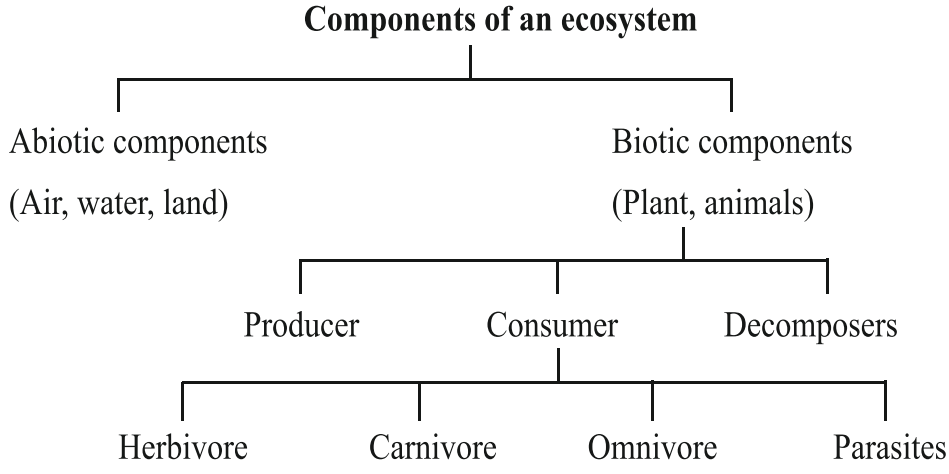
Ecosystem

All the interacting organisms in an area together with the non-living constituents of the environment form an ecosystem. *E.g.,* forest, pond temperature, rain, air, soil and all living organisms.

Types of ecosystem : It is of two types :

(a) Natural ecosystem : The ecosystem which exist in nature on its own. *E.g.,* forest, lake, ocean.

(b) Artifical ecosystem : Man-made ecosystems are called artificial ecosystem. *E.g.,* crop field, aquarium, garden.



(a) **Abiotic Components :** All the non-living components such as air, water, land, light, temperature etc. form the abiotic components.

(b) **Biotic Components :** All the living components such as plants, animals, bacteria, fungi etc. form the biotic components.

On the basis of nutrition biotic components are further divided into :

Producers : All green plants and blue-green algae can produce their own food using abiotic components (photosynthesis), hence called producers.

Consumers : Include all animals which depend on producers directly or indirectly for their food.

Consumers are further divided into :

(i) **Herbivores :** Plant eaters *e.g.,* goat, deer.

(ii) **Carnivores :** Flash eaters *e.g.,* tiger, crocodile.

(iii) **Omnivores :** Eats both plants and animals *e.g.,* human.

(iv) **Parasites :** Live on the body of host and take food from it, *e.g.* lice, cuscuta.

Decomposers : Include organisms which decompose the dead plants and animals *e.g.,* bacteria, fungi. These help in the replenishment of natural resources.

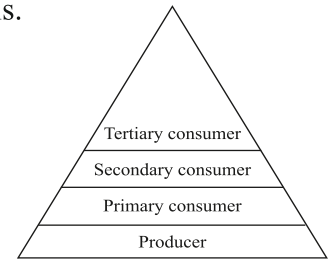
FOOD CHAIN

- Food chain is a series of organisms in which one organism eats another organism as food. *e.g.,*
  Grass $\rightarrow$ Deer $\rightarrow$ Lion
- In a food chain various steps where transfer of energy takes place is called a trophic level.

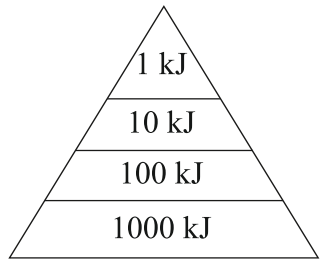
Flow of energy between trophic levels

- Flow of energy in a food chain is unidirectional.
- Green plants capture 1% of sunlight and convert it into food energy.
- **10 percent law :** Only 10% of energy is transferred to the next trophic level. The remaining 90% energy is lost as heat to the environment. Some amount goes into digestion and in doing work and the rest goes towards growth and reproduction.
- An average of 10% of the food eaten is turned into its own body and made available for the next level of consumers.

- Due to this gradual decrease in energy, food chains contain 3-4 trophic levels.



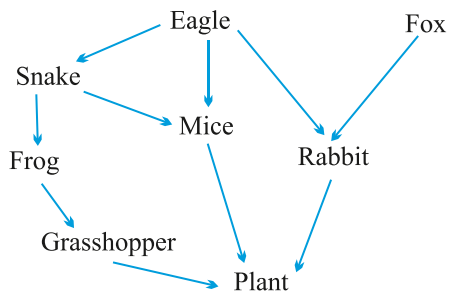
Trophic levels



Decrease in energy

- **Biological magnification :** The concentration of harmful chemicals increases with every next trophic level in a food chain. This is called biological magnification.
- Maximum concentration of such chemicals get accumulated in human bodies as human occupy the top level in any food chain.

Food web : In nature large numbers of food chains are interconnected forming a food web.



Food web

Environmental problems : Changes in the environment affect us and our activities change the environment around us. Human activities leads to pollution, deforestation etc.

Ozone layer

- Ozone layer is a protective blanket around the earth which absorbs most of the harmful UV (ultraviolet) radiations of the sunlight, thus protecting living beings from many health hazards such as skin cancer, cataract, weak immune system destruction of plants etc.
- Ozone (O_3) layer is present at higher levels of atmosphere (*i.e.,* stratosphere). It is a deadly poison at ground level.

Formation of ozone molecule

(i) The high energy UV radiations break down the O_2 molecules into free oxygen (O) atoms.

$$O \xrightarrow{UV} O + O \text{ (atoms)}$$

(ii) These oxygen atoms then combine with oxygen (O_2) molecule to form the ozone molecule.

$$O_2 + O \rightarrow O_3 \text{ (ozone)}$$

Depletion of ozone layer

- The decrease in the thickness of ozone layer over Antarctica was first observed in 1985 and was termed as ozone hole.
- This decrease was linked to excessive use of synthetic chemicals like chlorofluorocarbons (CFCs) which are used in refrigerators, ACs, fire-extinguishers, aerosols sprays etc.
- In 1987 United Nations Environment Programme (UNEP) succeeded in forging an agreement to stop CFC production at 1986 levels (KYOTO PROTOCOL) by all countries.

Garbage disposal

Garbage disposal is a main problem of today which effects our environment. Improvements in lifestyle have resulted in accumulation of large amounts of waste materials.

Garbage contains following type of materials :

(a) **Biodegradable :** Substances which can be decomposed by the action of micro-organisms are called biodegradable wastes.

E.g., fruit and vegetable peels, cotton, jute, dung, paper, etc.

(b) **Non-biodegradable wastes :** Substances which cannot be decomposed by the action of micro-organisms are called non-biodegradable wastes.

E.g., plastic, polythenes, metals, synthetic fibres, radioactive wastes, pesticides etc.

Micro-organisms release enzymes which decompose the materials but these enzymes are specific in their action that's why enzymes cannot decompose all the materials.

Some methods of waste disposal

(a) **Biogas plant :** Biodegradable waste can be used in biogas plant to produce biogas and manure.

(b) **Sewage treatment plant :** The drain water can be cleaned in sewage treatment plant before adding it to rivers.

(c) **Land fillings :** The wastes are buried in low lying areas and are compacted by rolling with bulldozers.

(d) **Composting :** Organic wastes are filled in a compost pit and covered with a layer of soil, after about three months garbage changes to manure.

(e) **Recycling :** Non-biodegradable wastes are recycled to make new items.

(f) **Reuse :** It is a conventional technique to use an item again *e.g.,* newspaper for making envelops.

(g) Incineration: It is a waste treatment process that are described as themal treatment, it converts the waste into ash mainly it is used to transforms medical wastes.

QUESTIONS

Mutiple Choice Question

1. Which pollutant released into the air during refrigeration and airconditioning is the greatest contribute to the depletion of ozone layer?
   (a) BHC (b) DDT
   (c) CFC (d) NEP
2. What percentage of sun's energy falling on the leaves of green plants is utilised by the plants in the process of photosynthesis and stored as chemical energy of food?
   (a) 99% (b) 10%
   (c) 1% (d) 20%
3. The flow of energy is an ecosystem is always
   (a) Unidirectional (b) Bidirectional
   (c) Cyclic (d) Multidirectional
4. If the energy transferred to a tertiary consumer in a food chain is 10J. How much enegy was available to the primary consumer?

(a) 100J (b) 500J

(c) 1000J (d) 5000J

5. The ten percent law is associated with

(a) Transfer of energy from various trophic to decomposers in a foodchain.

(b) Transfer of ATP energy into muscular enerrgy

(c) Transfer of chemical energy from one organism to another

(d) Transfer of sun's energy to the organisms called producers.

6. O_2 converted into O_3 by the action of

(a) Infrared radiations (b) Ultraviolet radiations

(c) Gamma radiations (d) Cosmic radiations

7. As human being occupy the top level in any food chain, the maximum concentration of insecticides get accumulated in our bodies. This phenomeon is known as.

(a) Pollution (b) Eutrophication

(c) Biological magnification (d) None of these

8. Which one of the following is as artificial ecosystem?

(a) Pond (b) Crop field

(c) Lake (d) Forest

9. What provides the energy which then flows through a food chain?

(a) Glucose (b) Oxygen

(c) Respiration (d) Sunlight

10. Which of the following is the best method to dispose of biological wastes from hospitals?

(a) Landfill (b) recycling

(c) incineration (d) composting

11. Which of the following is biodegradable.

(a) Plastic mugs (b) Leather belts

(c) Silver foil (d) Iron nails. &

Answers

1. (c) 2. (c) 3. (a) 4. (c) 5. (c) 6. (b) 7. (c) 8. (b) 9. (d) 10. (c) 11. (b)

Competency Based Question:

Ultraviolet radiation could destroy the organic matter Plants and planktons cannot thrive, both act as food for and sea animals respectively. For humans excessive exposure to ultraviolet radition leads to higher risk of skin cancer and cataracts. it is calculated that 1% decreases in ozone layer results in a 2–5 percent increase in the occurrence of skin cancer. other ill-effects of the reduction of protective ozone layer include-increase and suppression of the immune system.

a. How is ozone formed in the atmosphere?

b. What damages ozone layer?

(a) Cholorofluro carbons (b) Nitric oxide

(c) Free radicals of chlorine (d) All of them

c. Which of the following is global step that has been taken by the world to reduce ozone depletion?

(a) KYOTO protocol (b) Gothenberg protocol

(c) Montreal protocol (d) Aarhus protocol

d. In which layer of the atmosphere ozone layer is delpleting?

(a) Ionospehere (b) Stratosphere

(c) Lithosphere (d) Thermosphere

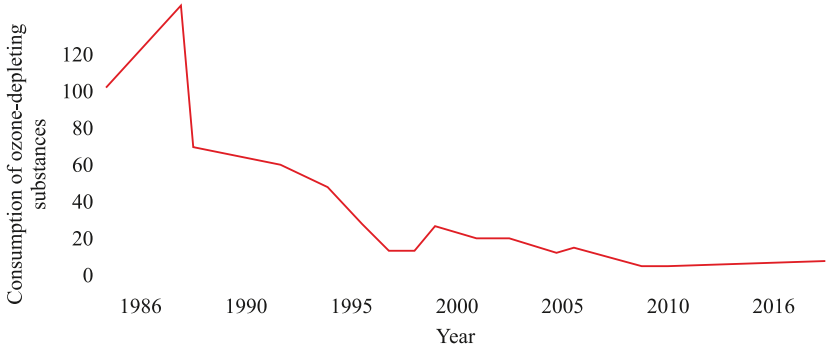
e. In the following graph shown, the magnitude of global decline in consumption of ozone deplecting substances (ODS) is shown. Study the graph and state during which period there is a sharp rise and a rapid decline seen in their consumption.

(a) During 1986–87 and 2000–2005

(b) During 1987–88 and 2016–2017

(c) During 2000–2001 and 2010

(d) During 1990–91 and 2016



Read the assertion and reason carefully and then mark the correct option out of the options given below :

(a) Both (A) and (R) are true and (R) is correct explanation of the assertion

(b) Both (A) and (R) are trrue but (R) is not correct explanation of the assertion

(c) (A) is true but (R) is false

(d) (A) is false but (R) is true

1. Asseration (A) : Decomposers act as cleaning system of envioronment

   Reason (R) : The decomposers cycle waste material only in hydrosphere.

2. Asseration (A) : Human beings occupy the top level in all food chain

   Reason (R) : The flow of energy in a food chain is unidirectional.

3. Asseration (A) : Some substances in nature are biodegradable while some are non-biodegradable.

   Reason (R) : The bacteria acting on the substances breakdown only the substances made from natural materials.

4. Asseration (A) : All green plants and certain blue-green algae can produce food by photosynthesis.

   Reason (R) : Due to Presence of cholorophyll.

5. Asseration (A) : The disposal of waste we generate is causing serious environmental problems.

   Reason (R) : We should reduce the waste generated.

Answers

1. (c) 2. (b) 3. (b) 4. (a) 5. (a)

1 Marks Question

1. Classify the following into biotic and abiotic components: Water, air, animals, Temperature, Plants, Soil.
2. Make a food chain with following organism-

   Snake, Grass, Eagle, Frog, Grass Hopper.

3. How much energy is transferred to the next trophic level

   (a) 1% (b) 90%

   (c) 10% (d) 100%

4. CFC Causes depletion of
   (a) Ozone (b) Oxygen
   (c) Nitrogen (d) None of these
5. The concentration of harmful chemicals increases with energy next trophic level in a food chain. Name this process.
6. Name two materials which can be recyled.
7. Define trophic level.
8. What is the full form of CFC and UNEP?
9. Name the radiations that are absorbed by the ozone layer.
10. Which will get more energy secondary consumers or tertiary consumers?
11. What is the functional unit of environment.
12. Which of the following are non biodegradable.
    Wool, Glass, Silver foil, Leather
13. Name any two parasites
14. What is KYOTO protocol?

Answers

1. Abiotic-Soil air, water temperature Biotic- Plants, animals
2. Grass → grasshopper → frog → snakes → eagle
3. 10%
4. a
5. Biological magnification
6. Paper, Plastic

2 Marks

1. Explain how does making of Kulhads affects our environment?
   (CBSE 2013)
2. What will happen if all the phytoplanktons are eliminated from pond?
3. State two differences between a consumer and producer.
4. Draw the line diagram showing flow of energy is an ecosystem.
5. Define a food web. State its significance for ecosystem.
6. What are phytoplanktons.
7. Name two natural ecosystem.

8. What is an ecosystem? List its two main components.
9. We do not clean ponds or lakes, but an aquarium. needs to be cleaned regularly explain.
10. In the following food chain 20J of energy was available to the hawks. How much would have been present in the plants?

Plants → Rats → Snakes → hawks.

SHORT ANSWER TYPER QUESTIONS

1. Why are green plants called producers?
2. Name two matrerials which can be recyled.
3. What will happen if we kill all the organisms of a trophical level?
4. Why only 10% energy is transferred to the next trophic level?
5. Which bag will you prefer for shopping and why?

   (a) Jute bag (b) Polythene bag
6. Why is ozone layer important for the existence of life on earth?
7. What is the role of decomposers in ecosystem?
8. Draw an energy pyramid showing different trophic level.
9. Differentiate betweem biodegradable waste and non-biodegradable waste.
10. How ozone molecule is formed in the atmosphere?
11. Define consumers. What are its further divisions?
12. Why natural ecosystem is more stable than artificial ecosystem?
13. Why some materials are not decomposed by the action of micro-organisms?
14. What is a food web? Explain with example.
15. Give any two ways in which non-biodegradable wastes would affect the environment.
16. How the components of an ecosystem are dependent on each other?

LONG ANSWER TYPE QUESTIONS

1. What are different methods for disposal of garbage?
2. What is food chain? Give its characteristics. Explain how energy flows through different trophic levels a food chain.
3. Explain how harmful chemicals enter our body.

Hints to Long Answer Type Questions

1. Methods for Garbage disposal :

Land filling	Compositing
Recycling	Resuse
Biogas plant	Sewage treatment plant

2. Food Chain : Transfer of energy through various trophic level in an ecosystem.

   Characteristics : (i) Unidirectional

   (ii) 1% of total solar energy is absorbed by plants.

   (iii) Transfer of energy throgh various trophic level is in accordance with 10 percent law.

3. Bio magnification

Sample Question Paper 2023-24
Class X
Science (Subject Code – 086)

Max. Marks: 80 Time **Allowed: 3 hours**

General Instructions:

i. This question paper consists of 39 questions in 5 sections.

ii. All questions are compulsory. However, an internal choice is provided in some questions. A student is expected to attempt only one of these questions.

iii. Section A consists of 20 objective type questions carrying 1 mark each.

iv. Section B consists of 6 Very Short questions carrying 02 marks each. Answers to these questions should be in the range of 30 to 50 words.

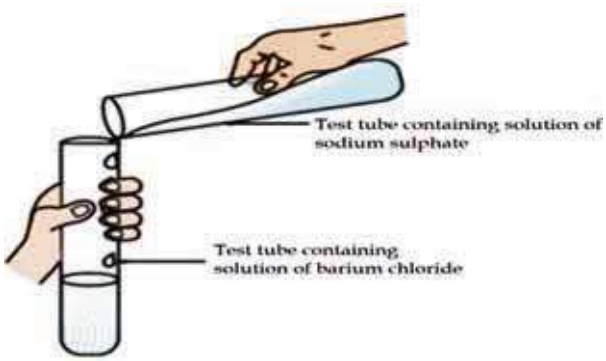
v. Section C consists of 7 Short Answer type questions carrying 03 marks each. Answers to these questions should be in the range of 50 to 80 words.

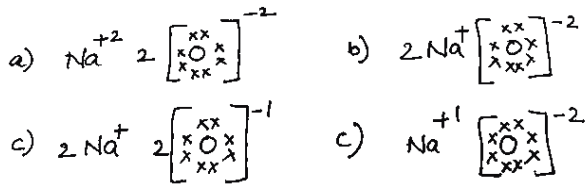
vi. Section D consists of 3 Long Answer type questions carrying 05 marks each. Answer to these questions should be in the range of 80 to 120 words.

vii. Section E consists of 3 source-based/case-based units of assessment of 04 marks each with sub-parts.

Section-A

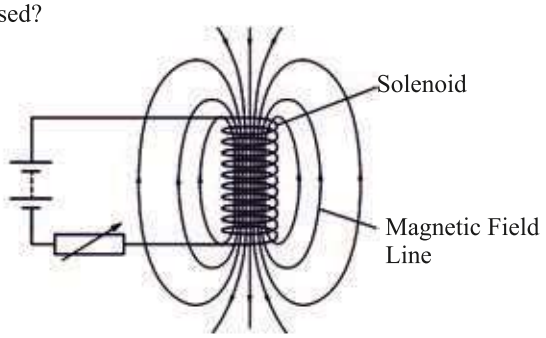
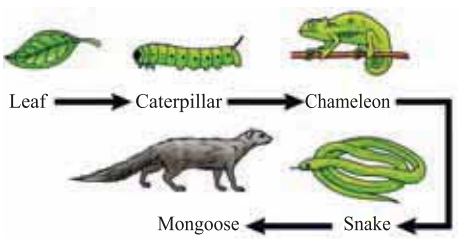
Select and write the most appropriate option out of the four options given for each of the questions 1 - 20. There is no negative mark for incorrect response.

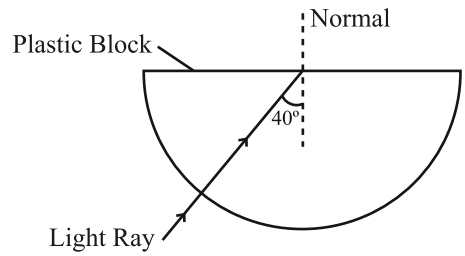
Q. Nos.	Questions	Marks
1	 Identify the product which represents the solid state in the above reaction. a) Barium chloride b) Barium sulphate c) Sodium chloride d) Sodium sulphate	1

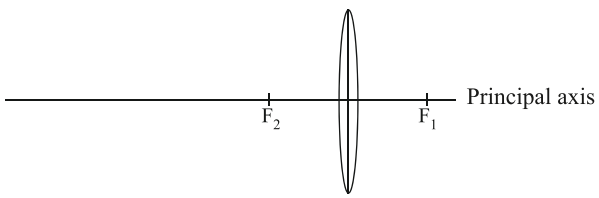
2	The colour of the solution observed after 30 minutes of placing zinc metal to copper sulphate solution is a) Blue b) Colourless c) Dirty green d) Reddish Brown	1
3	Mild non-corrosive basic salt is a) $Ca(OH)_2$ b) NaCl c) NaOH d) $NaHCO_3$	1
4	On adding dilute sulphuric acid to a test tube containing a metal 'X', a colourless gas is produced when a burning match stick is brought near it. Which of the following correctly represents metal 'X'? a) Sodium b) Sulphur c) Copper d) Silver	1
5	Which one of the following correctly represents Sodium oxide? 	1
6	An element with atomic number_____ will form a basic oxide. a) 7 (2,5) b) 17 (2,8,7) c) 14 (2,8,4) d) 11 (2,8,1)	1
7	An element 'M' has 50% of the electrons filled in the 3rd shell as in the 2nd shell. The atomic number of 'M' is: a) 10 b) 12 c) 14 d) 18	1
8	Generally food is broken and absorbed within the body of organisms. In which of the following organisms is it done outside the body? a) Amoeba b) Mushroom c) Paramoecium d) Lice	1

9	Receptors are usually located in sense organs. Gustatory receptors are present in a) tongue b) nose c) eye d) ear	1
10	A farmer wants to grow banana plants genetically similar enough to the plants already available in his field. Which one of the following methods would you suggest for this purpose? a) Regeneration b) Budding c) Vegetative propagation d) Sexual reproduction	1
11	Height of a plant is regulated by: a) DNA which is directly influenced by growth hormone. b) Genes which regulate the proteins directly. c) Growth hormones under the influence of the enzymes coded by a gene. d) Growth hormones directly under the influence a gene.	1
12	A sportsman, after a long break of his routine exercise, suffered muscular cramps during a heavy exercise session. This happened due to: a) lack of carbon dioxide and formation of pyruvate. b) presence of oxygen and formation of ethanol. c) lack of oxygen and formation of lactic acid. d) lack of oxygen and formation of carbon dioxide.	1
13	An object is placed in front of a convex mirror. Its image is formed : a) at a distance equal to the object distance in front of the mirror. b) at twice the distance of the object in front of the mirror. c) half the distance of the object in front of the mirror. d) behind the mirror and it's position varies according to the object distance.	1
14	When light enters the atmosphere it strikes on extremely fine particles, which deflect the rays of light in all possible directions, This is due to - a) reflection of light b) atmospheric refraction c) scattering of light d) dispersion of light	1
15	In 1987, an agreement was formulated by the United Nations Environment Programme (UNEP) to freeze the production of "X" to prevent depletion of "Y". "X" and "Y" respectively referred here are: a) Ozone; CFCs b) CFCs; rays UV c) CFCs; Ozone d) UV rays; Diatomic oxygen	1

<table>
<tr><td>16</td><td>Which of the following features relates to biodegradable substances?
a) Broken down by biological processes
b) Remain inert
c) Persist in environment for long time
d) May harm the ecosystem</td><td>1</td></tr>
<tr><td></td><td>Question No. 17 to 20 consist of two statements – Assertion (A) and Reason (R). Answer these questions selecting the appropriate option given below:
a) Both A and R are true, and R is the correct explanation of A.
b) Both A and R are true, and R is not the correct explanation of A.
c) A is true but R is false.
d) A is false but R is true.</td><td>1</td></tr>
<tr><td>17</td><td>Assertion: Rusting of Iron is endothermic in nature.
Reason: As the reaction is slow, the release of heat is barely evident.</td><td>1</td></tr>
<tr><td>18</td><td>Assertion: Probability of survival of an organism produced through sexual reproduction is more than that of organism produced through asexual mode.
Reason: Variations provide advantages to individuals for survival.</td><td>1</td></tr>
<tr><td>19</td><td>Assertion : A compass needle is placed near a current carrying wire. The deflection of the compass needle decreases when the magnitude of the current in the wire is increased.
Reason : The strength of a magnetic field at a point near the conductor increases on increasing the current.</td><td>1</td></tr>
<tr><td>20</td><td>Assertion: Biodegradable substances result in the formation of compost and natural replenishment.
Reason: It is due to breakdown of complex inorganic substances into simple organic substances.</td><td>1</td></tr>
<tr><td colspan="3">Section-B
Question No. 21 to 26 are very short answer questions</td></tr>
<tr><td>21</td><td>Dil. HCl is added to Zn granules." How will you prove that chemical change has taken place here? Support your response with two arguments.</td><td>2</td></tr>
<tr><td>22</td><td>State the post-fertilisation changes that lead to fruit formation in plants.</td><td>2</td></tr>
<tr><td>23</td><td>What is the purpose of making urine in the human body? Name the organs that stores and releases the urine.
OR
Why do arteries have thick and elastic walls whereas veins have valves?</td><td></td></tr>
<tr><td>24</td><td>The refractive indices of three media are given below:
<table><tr><th>Medium</th><th>Refractive Index</th></tr><tr><td>A</td><td>1.6</td></tr><tr><td>B</td><td>1.8</td></tr><tr><td>C</td><td>1.5</td></tr></table>A ray of light is travelling from A to B and another ray is travelling from B to C.
(a) In which of the two cases the refracted ray bends towards the normal?
(b) In which case does the speed of light increase in the second medium?
Give reasons for your answer.</td><td>2</td></tr>
</table>

25	A piece of wire of resistance R is cut into three equal parts. These parts are then connected in parallel. If the equivalent resistance of this parallel combination is R1, what is the value of the ratio R1 : R? OR Refer to the image below and state how the magnetic field pattern indicates regions where the magnetic field is stronger outside the magnet? What happens to the magnetic field when the current in the circuit is reversed?  	2
26	Study the food chain given below and answer the questions that follow:  a) If the amount of energy available at the third trophic level is 100 joules, then how much energy will be available at the producer level? Justify your answer. b) Is it possible to have 2 more trophic levels in this food chain just before the fourth trophic level? Justify your answer.	2
	Section-C Question No. 27 to 33 are short answer questions	
27	The given reaction shows one of the processes to extract the metals like Iron and Manganese. $MnO\square(s) + Al(s) \rightarrow Mn(l) + Al\square O\square(s) + Heat$ a) Give reason why the above reaction is known as a thermite reaction. b) Identify the substance oxidised and reduced in the above reaction. c) Give a reason why Aluminium is preferably used in thermite reactions.	3
28	An element 'M' with electronic configuration 2 8 3 combines separately with Cl-, SO4-2 anions. Write the chemical formulae of the compounds formed. Predict with the suitable reason the nature of the bond formed by element 'M' in general. How will the electrical conductivity of the compounds formed vary with respect to 'M'?	3

	OR A reddish-brown metal 'X', when heated in air, gives a black compound 'Y', which when heated in presence of H□ gas gives 'X' back. 'X' is refined by the process of electrolysis; this refined form of 'X' is used in electrical wiring. Identify 'X' and 'Y'. Draw a well-labeled diagram to represent the process of refining 'X'.	
29	We are advised to take iodised salt in our diet by doctors. Justify it's importance in our body.	3
30	What is the probability of a girl or a boy being born in a family? Justify your answer.	3
31	(i) Explain why the refractive index of any material with respect to air is always greater 1. (ii) In the figure below a light ray travels from air into the semi-circular plastic block. Give a reason why the ray does not deviate at the semi-circular boundary of the plastic block.  (iii) Complete the ray diagram of the above scenario when the light ray comes out of the plastic block from the top flat end.	3
32	(i) State the law that explains the heating effect of current with respect to the measurable properties in an electrical circuit. (ii) List the factors on which the resistance of a conductor depends.	2+1
33	Anannya responded to the question: Why do electrical appliances with metallic bodies are connected to the mains through a three pin plug, whereas an electric bulb can be connected with a two pin plug? She wrote: Three pin connections reduce heating of connecting wires. (i) Is her answer correct or incorrect? Justify. (ii) What is the function of a fuse in a domestic circuit?	2+1
	Section-D Question No. 34 to 36 are long answer questions.	
34	a) Rehmat classified the reaction between Methane and Chlorine in presence of sunlight as a substitution reaction. Support Rehmat's view with suitable justification and illustrate the reaction with the help of a balanced chemical equation. b) Chlorine gas was prepared using electrolysis of brine solution. Write the chemical equation to represent the change. Identify the other products formed in the process and give one application of each.	5

	OR Raina while doing certain reactions observed that heating of substance 'X' with vinegar like smell with a substance 'Y' (which is used as an industrial solvent) in presence of conc. Sulphuric acid on a water bath gives a sweet-smelling liquid 'Z' having molecular formula $C_4H_8O_2$. When heated with caustic soda (NaOH), 'Z' gives back the sodium salt of and the compound 'Y'. Identify 'X', 'Y', and 'Z'. Illustrate the changes with the help of suitable chemical equations.	
35	Given below are certain situations. Analyze and describe its possible impact on a person: a) Testes of a male boy are not able to descend into scrotum during his embryonic development. b) Vas deferens of a man is plugged. c) Prostate and seminal vesicles are not functional. d) Egg is not fertilised in a human female. e) Placenta does not attach to the uterus optimally. OR a) A doctor has advised Sameer to reduce sugar intake in his diet and do regular exercise after checking his blood test reports. Which disease do you think Sameer is suffering from? Name the hormone responsible for this disease and the organ producing the hormone. b) Which hormone is present in the areas of rapid cell division in a plant and which hormone inhibits the growth?	5 3+2
36	 The above image shows a thin lens of focal length 5m. (i) What is the kind of lens shown in the above figure? (ii) If a real inverted image is to be formed by this lens at a distance of 7m from the optical centre, then show with calculation where should the object be placed? (iii) Draw a neatly labelled diagram of the image formation mentioned in (ii) OR A 10 cm long pencil is placed 5 cm in front of a concave mirror having a radius of curvature of 40 cm. (i) Determine the position of the image formed by this mirror. (ii) What is the size of the image? (iii) Draw a ray diagram to show the formation of the image as mentioned in the part (i).	1+2+2 2+1+2

SECTION - E

Question No. 37 to 39 are case-based/data -based questions with 2 to 3 short sub-parts.
Internal choice is provided in one of these sub-parts.

37 The table given below shows the hints given by the quiz master in a quiz. **4**

S.NO	HINT
(i)	Substance 'C' is used as a preservative.
(ii)	'C' has two carbon atoms; 'C' is obtained by the reaction of 'A' in presence of alkaline Potassium permanganate followed by acidification.
(iii)	Misuse of 'A' in industries is prevented by adding Methanol, Benzene, and pyridine to 'A'.
(iv)	'F' is formed on heating 'A' in presence of conc Sulphuric acid.
(v)	'F' reacts with Hydrogen gas in presence of Nickel and Palladium catalyst.

Based on the above hints answer the following questions

a) Give the IUPAC names of A and F

b) Illustrate with the help of chemical equations the changes taking place. (A → C and A → F)

OR

Name the chemical reactions which occur in steps 2 and 5. Identify the compounds formed in these steps if 'A' is replaced with its next homologue.

38 Figures (a) to (d) given below represent the type of ear lobes present in a family consisting of 2 children – Rahul, Nisha and their parents. **4**

a) Rahul's Father

b) Rahul

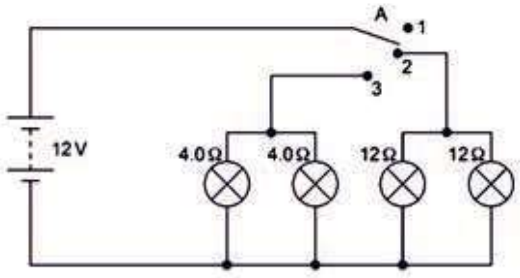
c) Rahul's Mother

d) Rahul's Sister Nisha

Type of year lobes

Excited by his observation of different types of ear lobes present in his family, Rahul conducted a survey of the type of ear lobes found {Figure (e) and (f)} in his classmates. He found two types of ear lobes in his classmates as per the frequency given below:

Sex	Free	Attached
Male	36	14
Female	31	19

	On the basis of above data answer the following questions. a) Which of the two characteristics - 'free ear lobe' or 'attached ear lobe' appears to be dominant in this case? Why? b) Is the inheritance of the free ear lobe linked with sex of the individual? Give reason for your answer. c) What type of ear lobe is present in father, mother, Rahul and his sister Nisha? Write the genetic constitution of each of these family members which explains the inheritance of this character in this family? (Gene for Free ear lobe is represented by F and gene for attached ear lobe is represented by f for writing the genetic constitution). OR Suresh's parents have attached earl obes. What type of ear lobe can be seen in Suresh and his sister Siya? Explain by giving the genetic composition of all.	
39	 Vinita and Ahmed demonstrated a circuit that operates the two headlights and the two sidelights of a car, in their school exhibition. Based on their demonstrated circuit, answer the following questions. (i) State what happens when switch A is connected to a) Position 2 b) Position 3 (ii) Find the potential difference across each lamp when lit. (iii) Calculate the current a) in each 12 Ω lamp when lit. b) In each 4 Ω lamp when lit. OR (iv) Show, with calculations, which type of lamp, 4.0 Ω or 12 Ω, has the higher power.	1+1+2

CBSE Question Paper 2022-23
Class X
Subject - Science

SECTION-A

(Multiple Choice Questions)

1. When aqueous solutions of potassium iodide and lead nitrate arc mixed, an insoluble substance separates out. The chemical equation for the reaction involved is : 1

(a) $KI + PbNO_3 \rightarrow PbI + KNO_3$

(b) $2KI + Pb(NO_3)_2 \rightarrow PbI_2 + 2KNO_3$

(c) $KI + Pb(NO_3)_2 \rightarrow PbI + KNO_3$

(d) $KI + PbNO_3 \rightarrow PbI_2 + KNO_3$

2. When Sodium bicarbonate reacts with dilute hydrochloric acid, the gas evolved is: 1

(a) Hydrogen; it gives pop sound with burning match stick.

(b) Hydrogen; it turn lime water milky.

(c) Carbon dioxide; it turns lime water milky.

(d) Carbon dioxide; it blows off a burning match stick with a pop sound.

3. Acid present in tomato is : 1

(a) Methanoic acid

(b) Acetic acid

(c) Lactic acid

(d) Oxalic acid

4. A metal ribbon 'X' burns in oxygen with a dazzling white flame forming a white ash 'Y'. The correct description of X, Y and the type of reaction is : 1

(a) X = Ca ; Y = CaO ; Type of reaction = Decomposition

(b) X = Mg; Y = MgO; Type of reaction = Combination

(c) X = Al ; Y = $A1_2O_3$: Type of reaction = Thermal decomposition

(d) X = Zn ; Y = ZnO; Type of reaction = Endothermic

5. The name of the salt used to remove permanent hardness of water is : 1

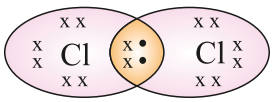
(a) Sodium hydrogen carbonate ($NaHCO_3$)

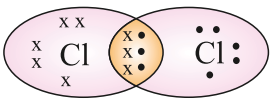
(b) Sodium chloride (NaCl)

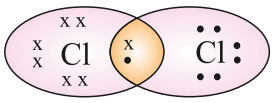
(c) Sodium carbonate decahydrate ($Na_2CO_3.1OH_2O$)

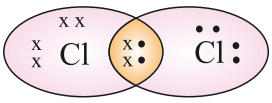
(d) Calcium sulphate hemihydrate ($CaSO_4 \cdot \frac{1}{2} H_2O$)

6. The electron dot structure of chlorine molecule is : 1

(a) 

(b) 

(c) 

(d) 

7. Sodium hydroxide is termed an alkali while Ferric hydroxide is not because : 1

(a) Sodium hydroxide is a strong base, while Ferric hydroxide is a weak base.

(b) Sodium hydroxide is a base which is soluble in water while Ferric hydroxide is also a base but it is not soluble in water.

(c) Sodium hydroxide is a strong base while Ferric hydroxide is a strong acid.

(d) Sodium hydroxide and Ferric hydroxide both are strong base but the solubility of Sodium hydroxide in water is comparatively higher than that of Ferric hydroxide.

8. Opening and closing of stomata is due to : 1

(a) High pressure of gases inside the cells.

(b) Movement of water in and out of the guard cells.

(c) Stimulus of light in the guard cells.

(d) Diffusion of CO_2 in and out of the guard cells.

9. Water in the root enters due to : 1

(a) the function of the root to absorb water.

(b) difference in the concentration of ions between the root and the soil.

(c) excess water present in the soil.

(d) diffusion of water in the roots.

10. Which one of the given statements is incorrect : 1

(a) DNA has the complete information for a particular characteristic.

(b) DNA is the molecule responsible for the inheritance of characters from parents to offsprings.

(c) Change in information will produce a different protein.

(d) Characteristics will remain the same even if protein changes.

11. Sensory nerve of a reflex arc carries information from the receptor cells to the: 1

(a) spinal cord

(b) brain

(c) muscles of the effector organ

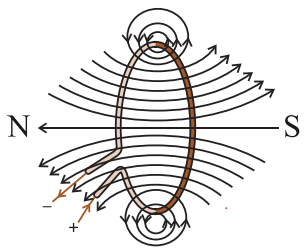
(d) bones of the receptor organ

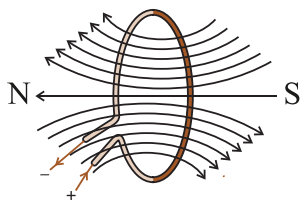
12. A cross between pea plant with white flowers (vv) and pea plant with violet flowers (VV) resulted in F_2 progeny in which ratio of violet (VV) and white (vv) flowers will be: 1

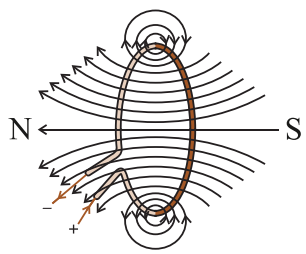
(a) 1:1 (b) 2:1

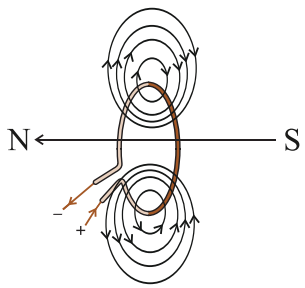
(c) 3:1 (d) 1:3

13. The correct pattern of magnetic field lines of the field produced by a current carrying circular loop is: 1

(a) 

(b) 

(c) 

(d) 

14. Two LED bulbs of 12W and 6W are connected in series. If the current through 12W bulb is 0.06A the current through 6W bulb will be: 1

(a) 0.04A (b) 0.06A

(c) 0.08A (d) 0.12A

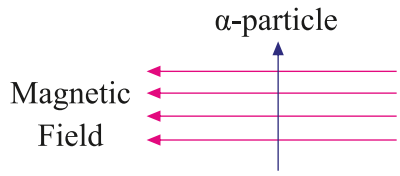
15. An alpha particle enters a uniform magnetic field as shown. The direction of motion of the alpha particle is : 1

(a) towards right

(b) towards left

(c) into the page

(d) out of the page



16. The resistance of a resistor is reduced to half of its initial value. If other parameters of the electrical circuit remain unaltered, the amount of heat produced in the resistor will become : 1

(a) four times

(b) two times

c) half

(d) one fourth

Q. No. 17 to 20 are Assertion - Reasoning based questions.

These consist of two statements Assertion (A) and Reason (R). Answer these questions selecting the appropriate option given below.

(a) Both (A) and (R) are true and (R) is the correct explanation of (A).

(b) Both (A) and (R) are true but (R) is not the correct explanation of (A).

(c) (A) is true but (R) is false.

(d) (A) is false but (R) is true.

17. **Assertion (A):** In humans, if gene (B) is responsible for black eyes and gene (b) is responsible for brown eyes, then the colour of eyes of the progeny having gene combination Bb, bb or BB will be black only. 1

Reason (R): The black colour of the eyes is a dominant trait. 1

18. **Assertion (A):** Reaction of Quicklime with water is an exothermic reaction.

Reason (R): Quicklime reacts vigorously with water releasing a large amount of heat. 1

19. **Assertion (A):** A current carrying straight conductor experiences a force when placed perpendicular to the direction of magnetic field.

Reason (R): The net charge on a current carrying conductor is always zero. 1

20. **Assertion (A):** The inner walls of the small intestine have finger like projections called villi which are rich in blood.

Reason (R): These villi have a large surface area to help the small intestine in completing the digestion of food.

SECTION - B

(Very Short Answer Questions)

21. Name a plant hormone responsible for bending of a shoot of a plant when it is exposed to unidirectional light. How does it promote phototropism? 2

22. (A) A student took a small amount of copper oxide in a conical flask and added dilute hydrochloric acid to it with constant stirring. He observed a change in colour of the solution. 2

(i) Write the name of the compound formed and its colour.

(ii) Write a balanced chemical equation for the reaction involved.

OR

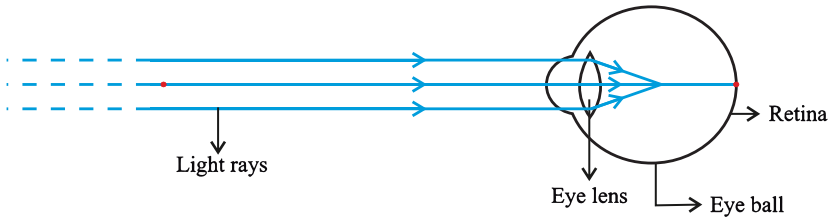
(B) The industrial process used for the manufacture of caustic soda involves electrolysis of an aqueous solution of compound 'X'. In this process, two gases 'Y' and 'Z' are liberated. 'Y' is liberated at cathode and 'Z', which is liberated at anode, on treatment with dry slaked lime forms a compound 'B'. Name X, Y, Z and B. 2

23. Two green plants are kept separately in oxygen free containers, one in the dark and other in sunlight. It was observed that plant kept in dark could not survive longer. Give reason for this observation. 2

24. What is the other name of 'tissue fluid' ? Write its two functions. 2

25. "Although gardens are created by man but they are considered to be an ecosystem." Justify this statement. 2

26. (A) Observe the following diagram and answer the questions following it : 2



(i) Identify the defect of vision shown.

(ii) List its two causes.

(iii) Name the type of lens used for the correction of this defect.

OR

(B) The colour of clear sky from the earth appears blue but from the space it appears black. Why? 2

SECTION-C

(Short Answer Questions)

27. Consider the following salts: 3

(i) YCI

(ii) NH_4X

(iii) ZCO_3

(a) What would be the pH of the salt solution if in YCl, Y is sodium? Give reason for your answer.

(b) If in salt NH_4X, X is nitrate, then its solution will give what colour with universal indicator? Why?

(c) What would be the change in colour in blue litmus solution if ZCO_3 is added to it and Z is potassium?

28. (i) While electrolysing water before passing the current some drops of an acid are added. Why? Name the gases liberated at cathode and anode. Write the relationship between the volume of gas collected at anode and the volume of gas collected at cathode. 3

(ii) What is observed when silver chloride is exposed to sunlight? Give the type of reaction involved.

29. The magnification produced when an object is placed at a distance of 20 cm from a spherical mirror is +1/2. Where should the object be placed to reduce the magnification to +1/3. 3

30. (A) (i) How does Paramecium obtain its food? 3

(ii) List the role of each of the following in our digestive system:

(a) Hydrochloric acid

(b) Trypsin

(c) Muscular walls of stomach

(d) Salivary amylase

OR

(B) (i) What is double circulation? 3

(ii) Why is the separation of the right side and the left side of the heart useful? How does it help birds and mammals?

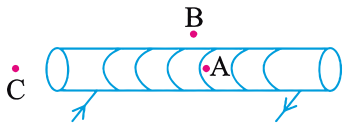
31. (A) (i) Why is an alternating current (A.C.) considered to be advantageous over direct current (D.C.) for the long distance transmission of electric power? 3

(ii) How is the type of current used in household supply different from the one given by a battery of dry cells?

(iii) How does an electric fuse prevent the electric circuit and the appliances from a possible damage due to short circuiting or overloading.

OR

(B) For the current carrying solenoid as shown, draw magnetic field lines and give reason to explain that out of the three points A, B and C, at which point the field strength is maximum and at which point it is minimum ? 3



32. Write one difference between biodegradable and non-biodegradable wastes. List two impacts of each type of the accumulated waste on environment if not disposed off properly. 3

33. (A) Define the term dispersion of white light. State the colour which bends (i) the most, (ii) the least while passing through a glass prism. Draw a diagram to show the dispersion of white light. 3

OR

(B) What is a rainbow? Draw a labelled diagram to show its formation. 3

SECTION-D

(Long Answer Questions)

34. (i) Name and explain the two modes of asexual reproduction observed in hydra. 5

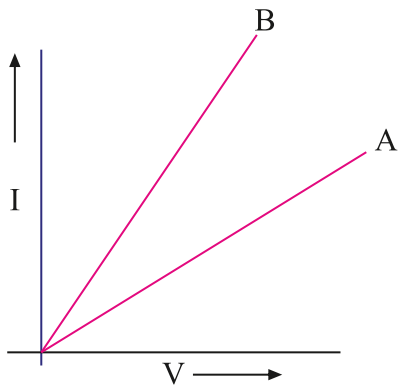
(ii) What is vegetative propagation? List two advantages of using this technique.

35. (i) How is electric current related to the potential difference across the terminals of a conductor? 5

Draw a labelled circuit diagram to verify this relationship.

(ii) Why should an ammeter have low resistance?

(iii) Two V - I graphs A and B for series and parallel combinations of two resistors are as shown. Giving reason state which graph shows (a) series, (b) parallel combination of the resistors.



36. (A) Write the chemical equation for the following: 5

(i) Combustion of methane

(ii) Oxidation of ethanol

(iii) Hydrogenation of ethene

(iv) Esterification Reaction

(v) Saponification Reaction

OR

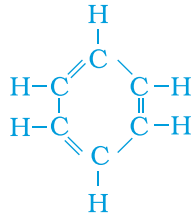
(B) (i) Draw two structural isomers of butane. 5

(ii) Draw the structures of propanol and propanone.

(iii) Name the third homologue of :

(a) alcohols (b) aldehydes

(iv) Name the following:

(a) 

(b) CH_3-CH_2CH=CH_2

(v) Show the covalent bond formation in nitrogen molecule.

SECTION-E

(Source Based/Case Based Questions)

37. The most obvious outcome of the reproductive process is the generation of individuals of similar design, but in sexual reproduction they may not be exactly alike. The resemblances as well as differences are marked. The rules of heredity determine the process by which traits and characteristics are reliably inherited. Many experiments have been done to study the rules of inheritance. 4

(i) Why an offspring of human being is not a true copy of his parents in sexual reproduction? 1

(ii) While performing experiments on inheritance in plants, what is the difference between F_1 and F_2 generation? 1

(iii) (A) Why do we say that variations are useful for the survival of a species over time? 2

OR

(iii) (B) Study Mendel's cross between two plants with a pair of contrasting characters. 2

RRYY	X	rryy
Round Yellow		Wrinkled Green

He observed 4 types of combinations in F_2 generation. Which of these were new combinations? Why do new features which are not present in the parents, appear in F_2 generation?

38. The ability of a medium to refract light is expressed in terms of its optical density. Optical density has a definite connotation. It is not the same as mass density. On comparing two media, the one with the 4

large refractive index is optically denser medium than the other. The other medium with a lower refractive index is optically rarer. Also the speed of light through a given medium is inversely proportional to its optical density.

(i) Determine the speed of light in diamond if the refractive index of diamond with respect to vacuum is 2.42. Speed of light in vacuum is 3×10^8 m/s. 1

(ii) Refractive indices of glass, water and carbon disulphide are 1.5, 1.33 and 1.62 respectively. If a ray of light is incident in these media at the same angle (sayΘ), then write the increasing order of the angle of refraction in these media. 1

(iii) (A) The speed of light in glass is 2×10^8 m/s and in water is 2.25×10^8 m/s. 2

(a) Which one of the two is optically denser and why?

(b) A ray of light is incident normally at the water-glass interface when it enters a thick glass container filled with water. What will happen to the path of the ray after entering the glass? Give reason.

OR

(iii) (B) The absolute refractive indices of water and glass are 4/3 and 3/2 respectively. If the speed of light in glass is 2×10^8 m/s, find the speed of light in (i) vacuum and (ii) water. 2

39. The melting points and boiling points of some ionic compounds are given below: 4

Compound	Melting Point (K)	Boiling Point (K)
NaCl	1074	1686
LiCl	887	1600
CaCl2	1045	1900
CaO	2850	3120
MgCl2	981	1685

These compounds are termed ionic because they are formed by the transfer of electrons from a metal to a non-metal. The electron transfer in such compounds is controlled by the electronic configuration of the elements involved. Every element tends to attain a completely filled valence shell of its nearest noble gas or a stable octet.

(i) Show the electron transfer in the formation of magnesium chloride. 1

(ii) List two properties of ionic compounds other than their high melting and boiling points. 1

(iii) (A) While forming an ionic compound say sodium chloride how does sodium atom attain its stable configuration? 2

OR

(iii) (B) **Give reasons:** 2

(i) Why do ionic compounds in the solid state not conduct electricity?

(ii) What happens at the cathode when electricity is passed through an aqueous solution of sodium chloride?