CHAPTER

15 OUR ENVIRONMENT

Syllabus

➢ *Our Environment : Ecosystem, Environmental problems, ozone depletion, waste production and their solution, biodegradable and non-biodegradable substances.*

Quick Review

- 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 environment problems such as depletion of ozone layer and production of huge amount of garbage.

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Biodegradable and Non-Biodegradable Substances and Global Warming.... P. 390

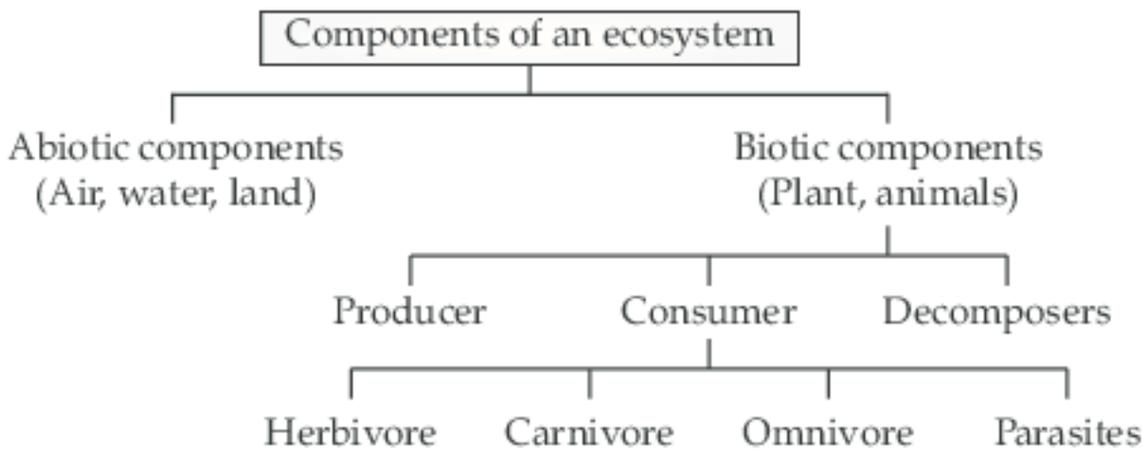
Ecosystem

- All the interacting organisms in an area together with the non-living constituents of the environment form an ecosystem. E.g., forest, pond etc.

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) Artificial ecosystem : Man-made ecosystem are called artificial ecosystem. e.g., crop field, aquarium, garden.



- Herbivores, carnivores, omnivores and parasites are the various type of consumers.
- **Consumers** are those organisms which depend upon the producers for food, either directly or indirectly by feeding on other consumers for their sustenance. They are also called heterotrophs.
- **Parasites** are those organisms that live on (ectoparasites) or in (endoparasites) the body of another organism, *i.e.*, host from which it obtain its nutrients, *e.g.*, parasites of man includes fleas and lice.
- **Decomposers** are those micro-organisms that obtain energy from the chemical break down of dead organisms or animals or plant wastes. Decomposers break down the complex organic substances into simple inorganic substances that go into the soil and are used up once more by the plants.
- **Food chain** is sequence of organisms through which energy is transferred in the form of food by the process of one organism consuming the other.

Examples :

Grass	→	Grasshopper	→	Frog	→	Snake	→	Eagle
(Producer)		(Herbivore)		(Carnivore)		(Carnivore)		(Top Carnivore)

- **Trophic levels** are the various steps or levels in the food chain where transfer of food or energy takes place. Producers are the first trophic level, herbivores are second trophic level, carnivores or secondary consumers are third trophic level and large carnivores or tertiary consumers are the fourth trophic level.
- **Food web** is the network of various food chains which are interconnected at various tropic levels. Since an organism can occupy position in more than one food chain, in a food web it occupies more than one trophic level.
- The flow of energy through different steps in the food chain is unidirectional. This means that energy captured by autotroph does not revert back to the solar input and it passes to the herbivores.

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 used is life processes (digestion, growth, reproduction etc.) by present trophic level.
- Due to this gradual decrease in energy, food chains contain 3-4 trophic levels.
- **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.
- Ozone (O_3) is an isotope of oxygen *i.e.*, it is a molecule formed by three atoms of oxygen. Ozone performs an essential function of shielding the surface of the earth from ultraviolet radiation of the sun.

$$O_2 + O \longrightarrow O_3$$

- Ozone layer is a layer of the earth's atmosphere in which most of the atmosphere's Ozone is concentrated.
- Ozone layer protects the earth from harmful radiations.
- There are several reasons for depletion of ozone layer.
- The foremost is the use of chlorofluorocarbons (CFCs). The other factor responsible for ozone destruction is the pollutant nitrogen monoxide (NO).
- When the harmful chemicals like chlorofluorocarbons (CFCs) are released into the air, it accumulates in the upper atmosphere and reacts with ozone resulting in reduction in thickness of the ozone layer.
- Thus, the ozone layer in the atmosphere becomes thinner and gets depleted allowing more ultraviolet rays to pass through it.
- The Antarctic hole in ozone layer is caused due to chlorine molecules present in chlorofluorocarbons (CFCs), that are used by human being.

Garbage disposal

- Improvements in lifestyle have resulted in accumulation of large amounts of waste materials.
- Garbage contains following type of materials :

  (a) Biodegradable wastes : 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, polythene, 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 waste are recycled to make new items.

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

Know the Terms

- **Environment :** It is the sum total of all external conditions and influences that affect the life and development of an organism, *i.e.* the environment includes all the physical or abiotic and biological or biotic factors.
- **Biodegradable substances** are those substance which are broken down into simpler, harmless substances in nature in due course of time by the biological processes such as action of micro-organisms.
- **Non–biodegradable substances** are those substance 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 or may concentrate in the food chain and harm the organisms.
- **Ecosystem :** It is the structural and functional unit of biosphere, comprising of all the interacting organisms in an area together with the non–living constituents of the environment. Thus, an ecosystem is a self sustaining system where energy and matter are exchanged between living and non-living components.
- **Producers :** Those organisms which produce food by photosynthesis *i.e.* organisms which can make organic compounds like sugar and starch from inorganic substances using the radiant energy of the sun in presence of chlorophyll.
- **Consumers :** Those organisms which depend upon the producers for food, either directly or indirectly by feeding on other consumers for their sustenance. Consumers therefore, feed upon those below it in a food chain and are called heterotrophs.
- **Decomposers :** They are those micro-organisms that obtain energy from the chemical breakdown of dead organisms or animals or plant wastes. These micro-organisms are decomposers as they breakdown the complex organic substances into simple inorganic substances that go into the soil and are used up once more by the plants.
- **Food Chain :** It is the sequence of organisms through which energy is transferred in the form of food by the process of one organism consuming the other. It shows the relationship of producer and consumer *i.e.* 'who eats whom'. Thus, it is a series of organisms taking part at various biotic level from the producer and ends in consumer.
- **Trophic Levels :** These are the various steps or levels in the food chain where transfer of food or energy takes place. The producers or autotrophs are the first trophic level, the herbivores or primary consumers are the second trophic level, the carnivores or secondary consumers are the third trophic level and the large carnivores or tertiary consumers are the fourth trophic level of the food chain.
- **Food Web :** It is the network of various food chains which are interconnected at various trophic levels. Since, an organism can occupy position in more than one food chain, in a food web it occupies more than one trophic level.
- **Flow of Energy :** The flow of energy through different steps in the food chain is unidirectional. This means that energy captured by autotroph does not revert back to the solar input and it passes to the herbivores. It moves progressively through various trophic level

TOPIC-1
Ecosystem and Food Chain

Very Short Answer Type Questions (1 mark each)

R Q. 1. **What is ecosystem ? [Delhi Set 31/1/1 2017]**

Or

Define ecosystem.

[Board Term II, Set-2024, 2012]

Ans. Ecosystem is the functional unit of the environment comprising of the living and non-living components. **[CBSE Marking Scheme, 2012]** 1

R Q. 2. **List two main components of our environment.**

[Board Term II, Set (2022) 2012]

Ans. Abiotic and biotic components. ½+½

[CBSE Marking Scheme, 2012]

R Q. 3. **List two biotic components of an ecosystem .**

[OD Comptt. 2017]

Ans. Living Organism — Plants and Animals. ½+½

R Q. 4. **List two man–made ecosystems.**

[Foreign Set 2017]

[Board Term II, Set AI 2012]

Ans. Garden and pond are man–made ecosystems. ½+½

R Q. 5. **What is meant by biological magnification ?**

[Board Term II, Set AI 2011]

Ans. Biological magnification is the process of increasing the concentration of harmful chemicals like pesticides from first trophic level to the last trophic level in a food chain. 1

U Q. 6. **DDT has entered food chain. Which food habit is safer-vegetarian or non-vegetarian ?**

Ans. Vegetarian habit is safer. Being closer to producers, less DDT will accumulate in our body. Bio magnification leads to higher level of DDT in higher trophic levels.

R **Q. 7. List two natural ecosystems.**

[Board Term II, Delhi Set I, 2016]

Ans. Natural ecosystem—Forest/Lake/Pond/River.

(Any two) ½ + ½

[CBSE Marking Scheme, 2016]

R **Q. 8. List two biotic components of a biosphere.**

[Board Term II, Delhi Set II, 2016]

Ans. Plants, animals, micro-organisms. **(Any two)** ½ + ½

[CBSE Marking Scheme, 2016]

R **Q. 9. We often use the word environment. What does it mean ?** **[Board Term II, Foreign I, 2016]**

Ans. It is the physical, chemical and biological conditions of the region. **[CBSE Marking Scheme, 2016]** 1

R **Q. 10. Name two decomposers operating in our ecosystem**

[Board Term II, Delhi, Set AI 2011, 2012]

Ans. Bacteria and Fungi. ½+½

U **Q. 11. Why is forest considered a natural ecosystem ?**

[Delhi 31/1/2 2017]

Ans. A forest ecosystem is a natural woodland unit consisting of all plants, animals and micro-organisms in that area functioning together with all of the non-living physical factors of the environment. 1

U **Q. 12. Why is a lake considered to be a natural ecosystem ?** **[Delhi 31/1/3 2017]**

Ans. Because a lake is a self-sustaining system.

[Marking Scheme, 2017]

Detailed Answer :

A lake ecosystem includes biotic (living) plants, animals and micro-organisms, as wll as abiotic (non-living) physical and chemical interactions. 1

R **Q. 13. Name the two abiotic components of ecosystem.** **[Board Term II, Set (2008), 2012]**

Ans. Temperature, rainfall, soil, minerals.

(Any two) ½+½

[CBSE Marking Scheme, 2012]

A **Q. 14. Write one negative effect, on the environment, of affluent life style of few persons of a society.**

[Board Term II, O.D. Set II, 2016]

Ans. Use of excessive non-biodegradable material in packaging

Excessive use of natural resources like coal and petroleum which causes pollution.

Affluent lifestyle results in generation of excessive waste materials. **(Any one)** 1

[CBSE Marking Scheme, 2016]

R **Q. 15. What are the various steps in a food chain called ?** **[Board Term II, Delhi, 2011]**

Ans. The various steps in a food chain are called trophic levels. 1

A **Q. 16. Why are green plants called producers ?**

[Board Term II, Delhi Set III, 2016]

Ans. Because the green plants prepare food by photosynthesis by using solar energy. 1

[CBSE Marking Scheme, 2016]

A **Q. 17. In the following food chain, grass provides 4000 J of energy to the grasshopper.**

Grass, Grasshopper, Frogs, Snakes

How much energy will be available to snakes and frogs ? **[Board Term II, Set (2015), 2012]**

Ans. Grass → Grasshopper → Frogs → Snakes
(4000 J) (400 J) (40 J) (4 J)

So, for snakes and frogs, 4 J and 40 J energy will be available by 10% law respectively. ½+½

[CBSE Marking Scheme, 2012]

A **Q. 18. In the following food chain, 100 J of energy is available to the lion. How much energy was available to the producer ?** **[OD 31/1 2017]**

Plants ⟶ Deer ⟶ Lion

Ans. Plants are producers — 10,000 J. 1

A **Q. 19. The first trophic level in a food chain is always a green plant. Why ?**

[Board Term II, O.D. Set II, 2015]

Ans. Green plants are producers. The first trophic level in a food chain is a producers *i.e.* those organisms which produce food by photosynthesis. 1

[CBSE Marking Scheme, 2015]

A **Q. 20. Why do producers always occupy the first trophic level on every food chain ?**

[Board Term II, Foreign Set II, 2016]

Ans. Because producers (plants) have the ability to trap solar energy with the help of chlorophyll.

[CBSE Marking Scheme, 2016] 1

A **Q. 21. Consider a food chain of the following :**

fish, crab, plankton, shark.

Arrange the above chain in proper order of trophic level. **[Board Term II, Set (2013), 2012]**

Ans. Plankton, crab, fish, shark. 1

[CBSE Marking Scheme, 2015]

A **Q. 22. Name the organism (s) belonging to fourth trophic level in the food chain comprising of :**

Snakes, Insects, Frogs, Plants, Hawks.

[Board Term II, Set (2007), 2012]

Ans. Hawks. **[CBSE Marking Scheme, 2012]** 1

A **Q. 23. Consider a food chain consisting of :**

Wheat, Rat, Snakes, Peacock.

What will happen if all the snakes are killed ?

[Board Term II, Set (2018), 2012]

Ans. If all the snakes of food chain are killed, the peacocks belonging to the next level will also die. Also the population of rats in the preceding level will highly increase. 1

[CBSE Marking Scheme, 2012]

A Q. 24. In a food chain of frog, grass, insect and snake assign trophic level to frog.
[Board Term II, O.D. Set III, 2016]

Ans. Grass ⟶ Insect ⟶ Frog ⟶ Snake
Frog is 3rd trophic level. ½ + ½
[CBSE Marking Scheme, 2016]
OR
[Topper Answer, 2016]

R Q. 25. Mention the role of micro-organisms like bacteria and fungi.
[Board Term II, Set (2008), 2012]

Ans. They break down the dead remains and waste product of organisms. 1
[CBSE Marking Scheme, 2012]

R Q. 26. Mention the role of decomposers in our ecosystem. [Board Term II, Set (2013), 2012]

Ans. These micro-organisms break down the complex organic substances into simple inorganic substances that go into the soil and are used once more by plants. [CBSE Marking Scheme, 2012] 1

A Q. 27. What will happen if we kill all the organisms in one trophic level ? [Board Term II, Delhi 2011]

Ans. If we kill all the organisms in one trophic level, the population of organisms in previous trophic level will increase. 1

A Q. 28. Which of the following are always at the second trophic level of food chain ?
Carnivores, Autotroph, Herbivores.
[Board Term II, O.D. Set III, 2015]

Ans. Herbivores or primary consumers are at the second trophic level. [CBSE Marking Scheme, 2015] 1

A Q. 29. Choose one consumer each that belongs to the second and third trophic levels from the organisms : Eagle, Frog, Tiger, Rabbit, Fox.
[Board Term II, Set (2021), 2012]

Ans. Second trophic level — Frog
Third trophic level — Rabbit. ½+½
[CBSE Marking Scheme, 2012]

A Q. 30. In the following food chain, plants provide 500 J of energy to rats. How much energy will be available to hawks from snakes ?[OD 31/2 2017]
Plants ⟶ Rats ⟶ Snakes ⟶ Hawks

Sol. Snakes $= 500 \times \frac{10}{100} = 50$ J

Hawks $= 50 \times \frac{10}{100} = 5$ J

(According to 10% Law) ½+½

U Q. 31. Using Kulhads as disposable cups to serve tea in trains, proved to be a bad idea. Why ?
[KVS 2017]

Ans. Making Kulhads on large scales leads to the loss of top soil. 1

A Q. 32. 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 ?
[Board Term II, O.D. Set I, 2015]

Ans. Only 10 percent energy is available from the first trophic level to second trophic level.
= 1000 joules 1
[CBSE Marking Scheme, 2015]

R Q. 33. Pesticides added to a field is seen in increased amount in the crop and in the birds that feed on them. What is this phenomenon called ?
[Board Term II, Set (2021), 2012]

Ans. Biological magnification. 1
[CBSE Marking Scheme, 2012]

Short Answer Type Questions-I (2 marks each)

R Q. 1. What are top carnivores ? Give two examples.
[Board Term II, SQP, 2013]

Ans. Organisms which feed upon small carnivores and constitute the fourth trophic level.
Examples : Hawk, lion. 1+1

U Q. 2. Write any two differences between food chain and food web. [NCERT Exemplar] [KVS-2014]

Ans.

S.No.	Food Chain	Food Web
(i)	Sequential process of one organism consuming the other.	Network of food chains with intercrosses and linkages.
(ii)	Each organism at a tropic level receives food from one group of organisms.	Each organism at a tropic level receives food from more than one group. 1 + 1

R Q. 3. Write any four examples of abiotic factors.

Ans. Four examples of abiotic factors are :
(i) Temperature, **(ii)** Rain, **(iii)** Soil, **(iv)** Wind.
½+½+½+½

A Q. 4. State two advantages of conserving (i) forests and (ii) wildlife. [OD 31/1/ 2017]

Ans. Conserving forests helps in (i) retaining sub soil water and (ii) checking floods/ any other ½+4
Conserving wild life helps in (i) maintaining ecological balance and (ii) protecting the nature (or any other) [CBSE Marking Scheme, 2017]

Detailed Answer :

Two advantages of conserving forests are :

(i) Forests maintain balance between abiotic and biotic factors of the environment.

(ii) They provide us various products in the form of food, medicines, wood and raw materials for different industries. **1**

Advantages of conserving wildlife are ;

(i) For protecting biodiversity.

(ii) Some wildlife is essential for the survival of other animals. **1**

A **Q. 5. Why must we conserve our forest ? List two factors responsible for causing deforestation.**

[OD 31/2 2017]

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

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

[CBSE Marking Scheme, 2017]

Detailed Answer :

We must conserve our forests to conserve the biodiversity, ecological stability, habitat for wildlife, purify air and protect our Earth from greenhouse effect. **1**

Two factors responsible for causing deforestation :

(i) Over utilisation of forest wood for human needs

(ii) Mining. **1**

A **Q. 6. With the help of an example of a food chain, prove that the flow of energy in the biosphere in unidirectional. [OD Comptt. 31/2 2017]**

Ans. Sun $\xrightarrow{1\%\text{ Energy}}$ Producer / Plant $\xrightarrow{10\%\text{ Energy}}$ Primary consumer/Herbivore $\xrightarrow{10\%\text{ Energy}}$ Secondary consumer / Carnivore $\xrightarrow{10\%\text{ Energy}}$ Top carnivore.

The above concept explained with the help of an example highlighting.

(1) At each trophic level only 10% of the energy is passed on to the next and the rest is either utilized for its own metabolic activities or is lost in the environment as heat. **1**

(2) Lost energy is not returned to the previous level/ Solar input. **1**

U **Q. 7. Differentiate between the food habits of organisms belonging to first and second trophic levels. [Board Term II, Set GFUTB86, 2015]**

Ans. Difference between food habits of Organisms belonging to first trophic level and second trophic level :

— The organisms at the first trophic levels are primary producers who make organic compounds using inorganic inputs like light, water, carbon dioxide etc. E.g. Plants.

— The organisms at the second trophic level are primary consumer. They are herbivores who eat plants (producers) for nutrition. *E.g.*, Deer.

[CBSE Marking Scheme, 2015] 1+1

R **Q. 8. What are decomposers ? List two important roles they play in the environment.**

[Board Term II, Outside Delhi Set I, 2014]

Ans. Decomposers are micro-organisms such as bacteria and fungi, that obtain nutrients by breaking down the remains of dead plants and animals.

Role of decomposers :

(i) They recycle matter by breaking down the organic remains and waste products of plants and animals.

(ii) These recycled matter are washed up and enter the soil from where plants absorb the nutrients again. **1+½+½**

U **Q. 9. List two reasons to show that the existence of decomposers is essential in an ecosystem.**

[Board Term II, Outside Delhi Set II, 2014]

OR

Explain the role of decomposers in the environment.

Ans. (i) They help in the breakdown of organic matter or biomass of dead plants and animals into simple inorganic raw materials such as CO_2, H_2O and nutrients.

(ii) They help in the natural replenishment of soil. They help in keeping the environment clean. **1+1**

A **Q. 10. State with reason any two possible consequences of elimination of decomposers from the earth.**

[Board Term II, Outside Delhi Set III, 2014]

Ans. (i) The earth would be covered with dead organisms and their excrement.

(ii) Decomposers are recyclers of life materials, returning materials to the system for use by living organisms. **1+1**

A **Q. 11. Why are only 4 or 5 trophic levels present in each food chain ?**

Ans. There is only 10% flow of energy from one trophic level to the next higher level. The loss of energy at each step is so great that very little usable energy remains after four or five trophic levels. Hence, only 4 to 5 trophic levels are present in each food chain. 2

A **Q. 12. Look at the following figures. Choose the correct one and give reason for your answer.**

[KVS 2017]

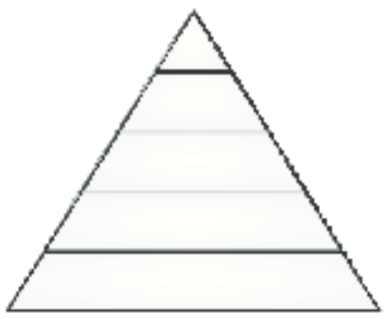


Fig 'A'

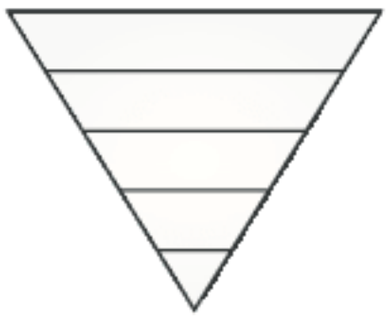


Fig 'B'

Ans. Fig. "A" is correct. In a ecosystem, the number of individuals at producer level is maximum. This number reduces at each successive level. Therefore, the shape is a pyramid with broader base and tapering apex. On an average 10% of the food changes into body mass and is available for the next level of consumers.

A **Q. 13. Aquarium required regular cleaning whereas lakes normally do not. Why ? [KVS 2017]**

Ans. Normally a lake has more diverse forms of life and hence a larger number of food chains. The leads to natural cleaning. Thus, the ecosystem is more stable. The aquarium has a very limited number of food chains and unable to sustain itself. But, sometimes there is excessive growth of algae in lake. Then it also needs to be cleaned.

A **Q. 14. Accumulation of harmful chemicals in our bodies can be avoided. Explain how this can be achieved ?**

[Board Term II, Set 8XSVHLC, QNA4XWT, 2014]

Ans. We should drink plenty of water, eat healthy food, perform exercise and do not take stress to avoid accumulation of harmful chemicals in our body. We should eat more vegetables especially cruciferous vegetables (such as broccoli, cauliflower, etc.) than meat. **[CBSE Marking Scheme, 2014] 2**

U **Q. 15. Why are bacteria and fungi called decomposers ? List any two advantages of decomposers to the environment ? [Delhi Comptt. 31/1/3 2017]**

Ans. Bacteria and fungi break down/decompose the dead remains and waste products or organisms. **1**

Advantages :

(i) Natural replenishment of soil

(ii) Recycling of nutrients in the soil. ½+½

[CBSE Marking Scheme, 2017]

Detailed Answer :

Bacteria and fungi are living organisms which decompose or consume the dead remains of other organisms.

Advantages

(i) Decomposers degrade garbage and the organic wastes which would otherwise cause environment problem. It prevents foul smell and check spread of disease.

(ii) Decomposers recycle the nutrients through biochemical cycle. **1+1**

U **Q. 16. Give two examples of decomposers ? State their important role in nature.[OD 31/1 Comptt. 2017]**

[Delhi 31/1/2 2017 Comptt.]

Ans. Two examples of decomposers are bacteria and fungi. After the death of any living organism, the decomposers breakdown the body cells and decompose it. This helps for the plants to acquire nutrients from the soil which help them to grow. Again the plants act as a food for the primary consumers and then by secondary and third consumers. **1+1**

A **Q. 17. In the food chain :**

Grass → deer → lion

Operating in a forest, what will happen if all the :

(i) lions are removed ?

(ii) deers are removed ?

[Board Term II, 2012, Set (2015) B1]

Ans. (i) Number of deer increases which will result in less amount of grass leading to soil erosion.

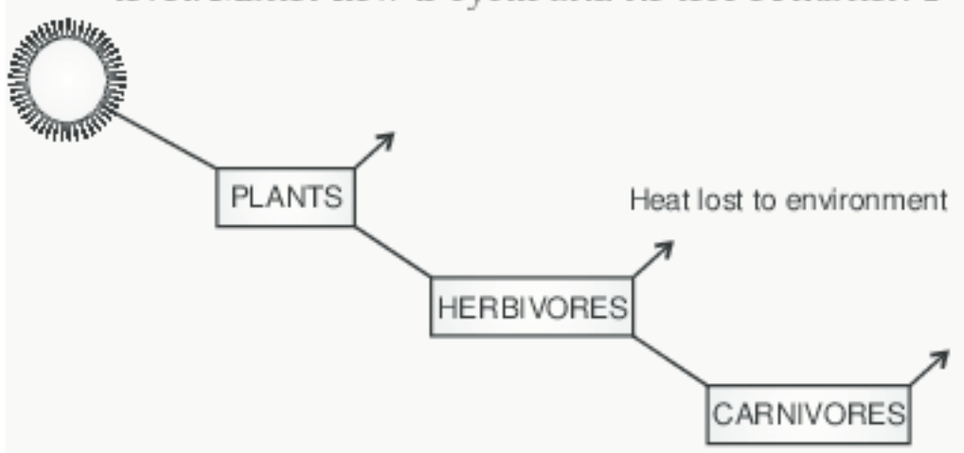
(ii) Food available for lions would be less. Amount of grassland will increase. **1+1**

[CBSE Marking Scheme, 2012]

U **Q. 18. Draw a labelled diagram to illustrate energy flow in an ecosystem.**

[Board Term II, Set FF 7 NBE 6, 2015]

Ans. Energy flow is unidirectional, dissipated at each level. Matter flow is cyclic and no loss of matter. **1**



[CBSE Marking Scheme, 2015] 1

A **Q. 19. In a food chain comprising Tiger, plants and goat, which will :**

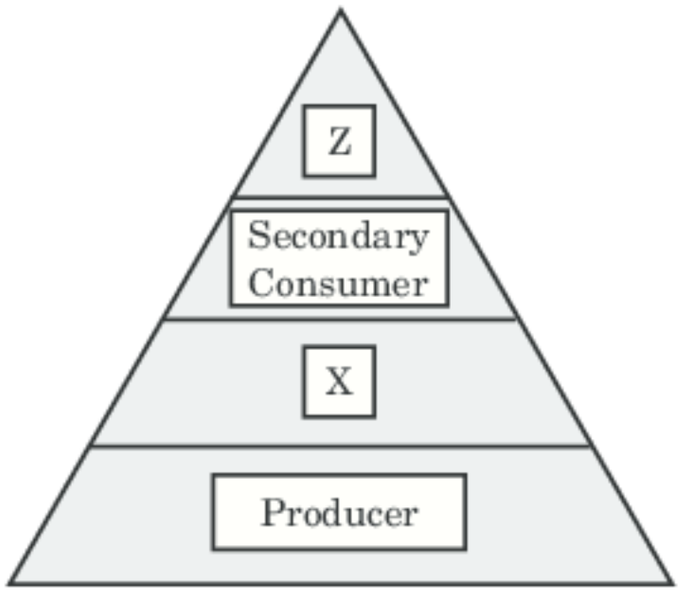
(i) Transfer the maximum amount of energy.

(ii) Receive minimum amount of energy. [KVS–2014]

Ans. (i) Plants, **(ii)** Tiger. **1+1**

A **Q. 20. Write the appropriate names of the trophic levels Z and X in the figure given below :**

[Board Term II, Set, (67001), 2012]



Ans. Z — Tertiary consumers **1**

X — Primary consumers **1**

[CBSE Marking Scheme, 2012]

A **Q. 21. Discuss the feeding patterns in a food web.**

Ans. In a food web, each organism is generally eaten by two or more other kinds of organisms which in turn are eaten by several other organisms.

So, a food web is a complex network of many interconnected food chains and feeding relationships. **2**

Short Answer Type Questions-II (3 marks each)

U **Q. 1. 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.**

[NCERT Exemplar] [Board Term II, O.D. Set II, 2015]

Ans. Ecosystem is the structural and functional unit of biosphere, comprising of all the interacting organisms in an area together with the non–living constituents of the environment.

Two main components of Ecosystem are :

(i) Biotic component

(ii) Abiotic component

An aquarium is an artificial and incomplete ecosystem compared to pond or lakes which are natural, self–sustaining and complete ecosystem where there is a perfect recycling of materials.

We need to clean of aquarium because of the :

(i) absence of natural decomposer.

(ii) stagnancy of water. **1+1+1**

R **Q. 2. What are biotic factors ? Give any two examples.**

Ans. Biotic factors are the living components of the environment which interact with each other as well as with the abiotic factors of the ecosystem. **Example :** Plants and animals. **2+½+½**

U **Q. 3. What is meant by food chain ? "The number of tropic levels in a food chain is limited." Give reason to justify this statement.**

[Board Term II, Foreign Set I, III]

Ans. Food chain is a simple representation of energy flow in nature.

For example : A rat eats grains,a snake eats a rat,which in turn, is eaten by an eagle.

In a food chain, the number of trophic levels are limited to 4-5. This is because according to 10% law of energy transfer, only 10% of energy passes from one trophic level to next. Thus the amount of energy decreases with successive trophic levels. After five trophic levels, existence of organisms would become impossible with such negligible amount of energy. **2+1**

U **Q. 4. Explain the phenomenon of 'Biological Magnification'. How does it affect organisms belonging to different trophic levels particularly the tertiary consumers ?**

Ans. Biological magnification refers to the process of increase in the concentration of a toxic chemical with increasing trophic level in a food chain. **1**

Harmful or poisonous substance such as DDT sprinkled to kill pests on plants enter the food chain. The plants absorb these harmful chemicals from soil along with water and minerals. They enter the food chain at producer level and then transfers to the next trophic level. The tertiary consumers get more higher levels of these chemicals. **2**

R **Q. 5. Define Ecosystem. Briefly describe the two types of ecosystem.**

Ans. Ecosystem is the structural and functional unit of biosphere, comprising of all the interacting organisms in an area together with the non-living constituents of the environment. **1**

Ecosystem are of two types :

(i) Natural Ecosystem : The natural ecosystems are terrestrial (land) as well as aquatic. The common example of land ecosystem are forest, grassland, desert, etc. The common examples of aquatic ecosystem are ponds, lakes, rivers, ocean, etc. **1**

(ii) Human made or Artificial Ecosystem : These ecosystems are made by human beings. The common examples are crop fields, gardens, parks, aquarium, etc. **1**

R **Q. 6. What are consumers ? Name the four categories into which the consumers are further grouped.**

[DDE 2017]

Ans. Organisms that feed directly or indirectly on producers and cannot synthesize their own food from inorganic sources are called consumers. **2**

Herbivores, Carnivores, Omnivores and Parasites are various categories of consumers. **1**

U **Q. 7. What are trophic levels ? Give an example of a food chain and state the different trophic levels in it.**

Ans. Trophic levels are differents teps of a food chain.

A trophic level is the level of species in an ecosystem on the basis of the source of nutrition such as producers, primary consumers, secondary consumers etc.

The producers form the first trophic level as they manufacture food.

The primary consumers form the second trophic level, the secondary consumers form the third, and the tertiary consumers form the fourth trophic level. **2**

Terrestrial food chain :

Grass	→	Deer	→	Lion
(Producer)		(Herbivore)		(Carnivore)
1st Trophic level		2nd Trophic level		3rd Trophic level

1

A **Q. 8. Why there is a progressive decline in the amount of energy at each trophic level ?**

Ans. At every trophic level, large amount of energy is lost in form of heat for maintaining metabolic activities and lost as heat. The amount of heat lost is generally 90 percent and the amount of energy retained is available from previous trophic level to the next. The decline in energy level leads to : **2**

(i) Lesser number of organisms in each trophic level.½

(ii) Limited number of trophic level in food chains. ½

U **Q. 9. Mention any three significance of a food chain.**

Ans. Significance of a food chain :

(i) It helps in understanding the food relationship and interactions among various organisms in an ecosystem.

(ii) It helps in following the basic mechanism of transfer of food energy and nutrients through various components of nature.

(iii) It helps to understand the movement of toxic substances in an ecosystem and the problem of their biological magnification. 3

A **Q. 10. "Energy flow in food chains is always unidirectional". Justify this statement. Explain how the pesticides enter a food chain and subsequently get into our body.**

[Board Term II, Delhi Set I, 2015]

[Board Term II, Outside Delhi Set I, III, 2014]

Ans. (i) In a food chain the energy moves progressively through the various trophic levels and is no longer available to the organisms of the previous trophic level/ energy captured by the autotrophs does not revert back to the solar input. 1

(ii) Pesticides used for crop protection when washed away/down into the soil/water bodies absorbed by plants/ producers. 1

(iii) On consumption they enter our food chain and being non-biodegradable, these chemicals get accumulated progressively and enter our body. 1

[CBSE Marking Scheme, 2015]

A **Q. 11. Give reason to justify the following :**

(i) The existence of decomposers is essential in a biosphere.

(ii) Flow of energy in a food chain is unidirectional.

[Board Term II, Delhi Set I, 2016]

Ans. (i) The existence of decomposers is essential in a biosphere because they breakdown complex organic substances into simple inorganic substances that can be absorbed by the plants.

Thus, decomposer : 1

(a) replenish the soil naturally ½

(b) helps in removing the biodegradable waste.

(ii) In a food chain the energy moves progressively through the various trophic levels, it is no longer available to the previous level (autotrophs) and the energy captured by the autotrophs does not go back to the solar input.

Hence, the flow of energy is unidirectional. 1½

[CBSE Marking Scheme, 2016]

A **Q. 12. (i) We do not clean ponds or lakes, but an aquarium needs to be cleaned. Why ?**

[NCERT Exemplar]

(ii) What are the harmful by-products of fertilizers industries ? How do they affect the environment ?

(iii) Why are crop fields known as artificial ecosystem ? **[NCERT]**

Ans. (i) An aquarium is an artificial and incomplete ecosystem in contrast to a pond / lake which is natural, self-sustaining and complete ecosystems. 1

(ii) The harmful by-products are gases such as SO_2 and NO_2. They cause extensive air pollution and are responsible for acid rain. 1

(iii) Crop fields are man-made and some biotic and abiotic components are manipulated by humans. 1

A **Q. 13. "Our food grains such as wheat and rice, the vegetables and fruits and even meat are found to contain varying amounts of pesticide residues." State the reason to explain how and why it happens ?**

[Board Term II, Delhi Set I, III, 2014]

Ans. A large number of pesticides and chemicals are used to protect our crops from pests and diseases. Some of these chemicals are washed down into the soil, while some enter in the water bodies. From the soil, they are absorbed by plants along with water and minerals; and from water bodies, they are taken up by aquatic plants and animals. This is how these chemicals enter the food chain. Because these chemicals cannot decompose, they accumulate progressively at each trophic level. As the food chain proceeds, the concentration of pesticides also increases. This increase in the concentration of harmful chemicals with each step of the food chain is called biomagnification. That is why food grains, such as wheat and rice, vegetables, fruits and even meat are found to contain pesticide residue. 3

A **Q. 14. Why is only 10% of energy made available to the next trophic level when green plants are eaten by herbivores ?** **[DDE 2017]**

Ans. When green plants are eaten by herbivores, a great deal of energy is lost in the form of heat to the environment. 1

Some amount goes into digestion and in doing work and the rest goes towards growth and reproduction. 1

The remaining is only an average of 10% of the food eaten that is turned into its own body and made available for the next level of consumers. 1

A **Q. 15. Calculate the amount of energy available to lion in the following food chain if plants have 20,000 J of energy available from the sun.**

Plant → Deer → Lion

Ans. According to 10% Law,

Plants have 20,000 J energy available.

Plants transferred their 10% energy to deer *i.e.*

$$20{,}000 \times \frac{10}{100} = 2000 \text{ J}$$ 1

Deer received 2000 J energy from the plants and now it transfer 10% energy of itself to lion.

$$2000 \times \frac{10}{100} = 200 \text{ J}$$ 1

Hence, lion will have 200 J energy from deer. 1

Long Answer Type Questions (5 marks each)

R Q. 1. **Define the following :** [DDE 2017]

(i) Food chain, (ii) Trophic level, (iii) Producers, (iv) Parasites, (v) Non-biodegradable substances.

Ans. (i) Food chain : A succession of organisms in an ecological community that constitutes a continuation of food energy from one organism to another as each consumer is a lower member and in turn is preyed upon by a higher member is called a food chain. 1

(ii) Trophic level : Each step or level of the food chain is called trophic level. 1

(iii) Producers : Producers are organisms like plants and blue green algae that produce complex organic compound from simple inorganic molecules using energy from sunlight in presence of chlorophyll. 1

(iv) Parasites : An organism that lives on or in another organism, obtain nourishment and protection while offering no benefit in return is called a **parasite.** 1

(v) Non-biodegradable substance are substances that cannot be broken down by biological processes. 1

R Q. 2. **Name the following :**

(i) Organisms feeding on animal and plant food.

(ii) Organisms breaking down wastes of living beings.

(iii) The organisms occupying the first trophic level of any food chain.

(iv) A complex network of many interconnected food chains and feeding relationships.

(v) The cumulative increase in the concentrations of a persistent substance in successively higher levels of the food chain.

Ans. (i) Omnivores, **(ii)** Decomposers, **(iii)** Producers, **(iv)** Food web, **(v)** Biological magnification. 1×5=5

R Q. 3. **Give any two examples of each :**

(i) Organisms occupying the first trophic level,

(ii) Carnivores

(iii) Biodegradable wastes of humans

(iv) Ecosystem

(v) Abiotic factors of an ecosystem

Ans. (i) Trees, Shrubs, **(ii)** Lion, Cheetah, **(iii)** Used and torn paper, broken pieces of wooden furniture. **(iv)** Forest, Garden, **(v)** Temperature, rainfall. 1×5=5

R Q. 4. **(i) What is the full form of : (a) UNEP, (b) CFCs.**

(ii) On what basis are organisms grouped as producers, consumers and decomposers ?

(iii) Write two problems that would arise if there were no decomposers in an ecosystem.

[DDE 2017]

Ans. (i) The full form of :

(a) UNEP : United Nations Environment Programmes. 1

(b) CFCs : Chlorofluorocarbons. 1

(ii) Organisms can be grouped as producers, consumers and decomposers according to the manner in which they obtain their food from the environment. 1

(iii) Two problems that would arise in absence of decomposers in an ecosystem are :

(a) Decomposition of garbage as well as dead plants and animals will not take place. 1

(b) Natural replenishment of soil will not take place. 1

TOPIC-2
Biodegradable and Non–Biodegradable Substances and Global Warming

Very Short Answer Type Questions (1 mark each)

R Q. 1. **What is Ozone ? [Board Term II, Set (2022), 2012]**

Ans. Ozone is a molecule formed by three atoms of oxygen, which shields the surface of the earth from ultraviolet radiations. 1

[CBSE Marking Scheme, 2012]

R Q. 2. **State the essential function performed by Ozone at the higher levels of the atmosphere.**

[Delhi Comptt. 31/1/1 2017]

Ans. It shields the surface of the earth from ultraviolet (UV) radiation from the sun. 1

A Q. 3. **Why is ozone layer getting depleted at the higher levels of the atmosphere ?**

[Board Term II, Set AI, 2011]

Ans. Ozone layer is getting depleted at the higher levels of the atmosphere due to effect of chlorofluorocarbons (CFCs) which are used as refrigerants and in fire extinguishers. 1

R Q. 4. **Name the chemical compound which depletes ozone layer.** **[Board Term II, Set 2007, 2012]**

Ans. Chlorofluorocarbons. 1

[CBSE Marking Scheme, 2012]

A **Q. 5. The depletion of ozone layer is a cause of concern. Why ?[Board Term II, O.D. Set I, 2016]**

Ans. Ultraviolet rays from the sun penetrate down the earth and cause health hazards/skin cancer in human being. **[CBSE Marking Scheme, 2016]** 1

R **Q. 6. What is the function of ozone in the upper atmosphere ? [Board Term II, Delhi Set I, 2015]**

Ans. Ozone layer protects the earth from harmful radiations like high energy ultraviolet radiations from passing through it. 1

[CBSE Marking Scheme, 2015]

R **Q. 7. What is biodegradable substance ?**

[Delhi Comptt. 2017]

Ans. Substances that can be broken down by micro-organisms in natural simple harmless substances. 1

A **Q. 8. Why are some substance non–biodegradable ?**

[Board Term II, Foreign, 2011]

Ans. Some substances are non-biodegradable because they cannot be broken down into simpler harmless substance in nature. 1

R **Q. 9. Why should biodegradable and non-biodegradable wastes be discarded in two different dustbins ? [OD Comptt. 31/1 2017]**

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

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

(iii) Non-biodegradable items can be sent for a appropriate reuse/recycle. ½×2 **[Any two]**

[CBSE Marking Scheme, 2017]

Detailed Answer :

Separation should be done actually to save our resources for future benefits and to save our environment from pollution. 1

U **Q. 10. What happens during the first step of ozone formation in the atmosphere ?**

[Board Term II, Set 2021, 2012]

Ans. Oxygen in the presence of ultraviolet rays splits oxygen molecule into two oxygen atoms. 1

[CBSE Marking Scheme, 2012]

R **Q. 11. Write the full name of the group of compounds mainly responsible for the depletion of ozone layer. [Board Term II, Foreign Set I, 2015]**

Ans. Chlorofluorocarbons. 1

A **Q. 12. Why is excessive use of CFCs a cause of concern?**

[Board Term II, Foreign Set III, 2016]

Ans. When CFC'S reach upper layers of the atmosphere, they cause depletion of ozone layer, and allow harmful UV radiations to reach the surface of the earth to create health hazards. ½ + ½

[CBSE Marking Scheme, 2016]

U **Q. 13. How is ozone formed in the upper part of the atmosphere of the earth ?**

[Board Term II, Foreign 2011]

Ans. Ozone at higher level of atmosphere is a product of UV radiation acting on oxygen (O_2) molecule. 1

R **Q. 14. Which chemical is used in fire extinguishers ? How it is harmful ?**

[Board Term II, Set 2045, 2012]

Ans. Chlorofluorocarbons

It depletes ozone layer. ½+½

[CBSE Marking Scheme, 2012]

A **Q. 15. The following organisms form a food chain. Which of these will have the highest concentration of non-biodegradable chemicals ? Name the phenomenon associated with it : Insects, Hawk, Grass, Snake, Frog.**

[Board Term II, Foreign Set I, 2015]

Ans. Hawk.

Biomagnification. ½ + ½

[CBSE Marking Scheme, 2015]

R **Q. 16. Which disease is caused in human beings due to depletion of ozone layer in the atmosphere ?**

[Board Term II, Foreign, 2010]

Ans. Skin cancer is caused in human being due to depletion of ozone layer in the atmosphere. 1

A **Q. 17. List two non-biodegradable wastes generated daily in kitchen which can be recycled.**

[Board Term II, Set (67004), 2012]

Ans. Polythene bags and plastic containers. ½+½

[CBSE Marking Scheme, 2012]

R **Q.18. Mention one negative effect of our affluent life style on the environment.**

[Board Term II, O.D. Set I, 2013]

Ans. Industrial effluents, domestic sewage, emission from vehicles causes pollution. 1

[CBSE Marking Scheme, 2013]

A **Q. 19. State a way to prevent accumulation of harmful chemicals in our bodies.**

[Board Term II, Set (67004), 2012]

Ans. To minimize the use of chemicals / pesticides in agriculture. **[CBSE Marking Scheme, 2012]** 1

R **Q. 20. Name the gas which is produced due to incomplete combustion of fossil fuel.**

[Board Term II, Set UV6TFLN, 2015]

Ans. Carbon monoxide. 1

Short Answer Type Questions-I

(2 marks each)

R **Q.1. What is Ozone ? Name the chemicals that damage the Ozone layer. [Delhi Comptt. 2017]**

Ans. Ozone is a gas made up of three oxygen atoms, occurs naturally in small amounts in the upper atmosphere and protects life on Earth from the Sun's ultraviolet (UV) radiations. The chemical that damage Ozone layer is Chlorofluorocarbon (CFCs). 1+1

K **Q.2. What is Ozone ? How does it protect the organisms on the earth ?**

OR

What is ozone and how does it affect any ecosystem ?

Ans. Ozone is a triatomic molecule of oxygen (O_3). It forms a protective blanket over the earth's atmosphere and its depletion causes harmful effects on human. It absorbs the UV-radiation coming from the sun. 2

U **Q.3. Write any four effects of ozone depletion on our health. [Board Term II, Set-67001, 2012]**

Ans. Effects of ozone depletion on health can be :

(i) Skin cancer ½

(ii) Damage to eyes ½

(iii) Effect on immunity ½

(iv) Can change the structure of DNA. ½

[CBSE Marking Scheme, 2012]

U **Q.4. How can you help in reducing the problem of waste disposal ? Write any two methods.**

[OD Comptt. 31/3 2017]

Ans. Segregation of waste at the point of its generation for convenient disposal.

Change in attitude producing less waste by adopting 3 R's policy. 1×2

[CBSE Marking Scheme, 2017]

Detailed Answer :

We can help in reducing the problem of waste disposal by these methods :

(i) By separating biodegradable substances from non-biodegradable substances.

(ii) By reducing, reusing and recycling non-biodegradable substances. 1+1

A **Q.5. We often observe domestic waste decomposing in the bylanes of residential colonies. Suggest ways to make people realize that improper disposal of waste is harmful to the environment.**

[Board Term II, O.D. Set I, 2015, Delhi 2013]

Ans. (i) Banners and signboards, educating people about the ill effects of improper disposal of wastes can be erected / hanged in residential colonies.

(ii) Street plays highlighting the ill effects of improper disposal of wastes can be organized. 1+1

[CBSE Marking Scheme, 2013]

A **Q.6. Industrialization is the one of the main cause of deterioration of environment." List any four reasons in favour of this statement.**

[Board Term II, Set B1, 2011]

Ans. (i) Noise and air pollution are increasing. ½

(ii) Waste leads to water pollution. ½

(iii) SO_2, NO_2 etc. emitted by the industries are toxic. ½

(iv) Radioactive radiations emitted by nuclear power stations are toxic to living organisms. ½

A **Q.7. It is said, there is a need to put a blanket ban on the products containing aerosols. What are aerosols ? Why is there a demand to put a ban on them ? [Board Term II, Set 8XSVHL, 2014]**

Ans. An aerosol can be defined as a dispersion of solid and liquid particles suspended in gas. Atmospheric aerosols, unsurprisingly, refer to solid and liquid particles suspended in air. Aerosols are produced by dozens of different processes that occur on land and water surfaces, and in the atmosphere itself.

There is a demand to put a ban on them because of their deteriorating effect on Earth's ozone layer. 1+1

A **Q.8. Give any two ways in which biodegradable substances would affect the environment.**

[Board Term II, Set (2018), 2012]

Ans. (i) They produce foul smell during decomposition process. 1

(ii) They may produce harmful gases such as ammonia, methane and carbon dioxide. 1

[CBSE Marking Scheme, 2012]

A **Q.9. "The maximum concentration of harmful chemicals accumulates in human beings." State the phenomenon involved and justify this statement. [Board Term II, Set (2018), 2012]**

Ans. Bio-magnification. ½

Non-degradable chemicals accumulates progressively at each trophic level. Since the man is at the apex of all the food chains, the concentration of harmful chemicals may be more in human beings. **[CBSE Marking Scheme, 2012]** 1½

A **Q.10. 'Traditional use of forest areas is not useful in maintaining biodiversity. Do you agree with this statement ? Explain with the help of an example. [Board Term II, SQP, 2013]**

Ans. The Great Himalayan National Park contains within its reserved area, alpine meadows which were grazed by sheep in summer. But now without regular grazing by sheep, the grass first grows very tall and then falls over, preventing fresh growth. 2

A **Q.11. List two environment friendly practices or habits which need to be followed by every member of a family/ community. Explain how these practices will support the "Save the Environment" mission.**

[Board Term II, Delhi Set III, 2014]

Ans. (i) Gardening and planting trees.

(ii) Use of gunny bags / paper bags in place of polythene.

(iii) Use of compost and vermicompost in place of fertilizers.

(iv) Separation of biodegradable and non-biodegradable substances. **(Any two) 1+1**

A **Q. 12. Write the harmful effects of using plastic bags, on the environment. Suggest alternatives to plastic bags. [Board Term II, O.D. I, 2013] [Foreign Set 2017]**

Ans. Plastic bags are non-biodegradable wastes, they are not degraded, they begin to stink, emitting foul gases, spoil the beauty of places and contaminate soil, water and air with toxins.

Cloth bags are used instead of plastic bags because they are stronger, more durable and washable. **1+1**

A **Q. 13. Why do enzymes which break down carbohydrates in foods does not break down coal ?**

Ans. Enzymes are specific in their action. Specific enzymes are needed for the breakdown of a particular substance.

So, enzymes which digest carbohydrates in food are specific for acting only on the carbohydrates and hence cannot act on other substances like coal. 2

A **Q. 14. In some states of our country there is a ban on the use of polythene bags for shopping. Why? List three advantages of using jute or cloth bags over polythene bags.**

[Board Term II, Delhi Set III, 2014]

Ans. There is a ban on the use of polythene bags for shopping in some states of our country because they cannot be degraded naturally by the action of microorganisms. Because of their non-biodegradability, they stay in the soil for a long time and continue to poison it with toxic by-products that keep leaching from them. Also, they do not allow water to seep in, as they are waterproof. These polythene bags when accidentally eaten by stray animals can harm them and can even cause their death.

The three advantages of using jute or cloth bags over polythene bags are as follows :

(i) Cloth or jute bags are environment-friendly; they are biodegradable.

(ii) They are renewable and can be easily recycled.

(iii) They have more strength than polythene bags because they are thick and can be used again and again. **½ x 4**

A **Q. 15. Why is Government of India imposing a ban on the use of polythene bags ? Suggest two alternatives to use these bags and explain how this ban is likely to improve the environment.**

[Board Term II, Delhi Set I, 2014]

Ans. Government of India is imposing a ban on the use of polythene bags because they cannot be degraded naturally by the action of microorganisms. Because of their non-biodegradability, they stay in the soil for a long time and continue to poison it with toxic by-products that keep leaching from them. Also, they do not allow water to seep in, as they are waterproof. These polythene bags, when accidentally eaten by stray animals, can harm them and can even lead to their death.

Jute and cloth bags can be used in place of polythene bags.

They are environment-friendly as they are biodegradable.

They are renewable and can be easily recycled.

Thus, using jute and cloth bags will help to reduce pollution. **1+½+½**

Short Answer Type Questions-II

(3 marks each)

R **Q. 1. What is ozone ? Show the reactions of formation of ozone from oxygen in the atmosphere.**

[DDE 2017]

Ans. Ozone (O_3) is a molecule formed by three atoms of oxygen. **1**

$$O_2 \xrightarrow{U.V.} O + O \quad \textbf{1}$$

$$O + O_2 \rightarrow O_3$$

Ozone **1**

R **Q. 2. What is ozone ? How and where is it formed in the atmosphere ? Explain how does it affect an ecosystem. [Board Term II, Delhi Set I, 2015]**

Ans. Ozone is a molecule containing three atoms of oxygen (O_3)/ a highly poisonous gas present in the upper layer of the atmosphere. **1**

Formation of ozone — The UV radiations split some molecular oxygen (O_2) apart into free oxygen atoms (O + O). These atoms then combine with molecular oxygen to form ozone.

Or

$$O_2 \xrightarrow{UV} O + O$$

$$O + O_2 \longrightarrow O_3$$

(Ozone) **½ + ½**

Effect — Ozone layer shields the surface of the earth from damaging UV radiations of the sun. **1**

[CBSE Marking Scheme, 2015]

U **Q. 3. Explain the role of UV radiation in formation of ozone with the help of a chemical reaction. Name the pollutant and write its role in depletion of ozone layer. [Board Term II, O.D. 2013]**

Ans. The high energy of UV radiations breakdown some molecules of O_2 into atoms of oxygen. One atom of oxygen binds to one molecule of O to form O_3. Ozone prevents UV rays to reach earth surface.

$$O_2 \xrightarrow{U.V.} O + O$$

$$O_2 + O \longrightarrow O_3 \text{ (Ozone)}$$

Example : Chlorofluorocarbons. **1+1+1**

A **Q. 4. Damage to the ozone layer is a cause for concern. Justify this statement. Suggest any two steps to limit this damage. [NCERT]**

OR

Why is damage to the ozone layer a cause for concern ? What steps are being taken to limit this damage ? **[NCERT]**

Ans. Due to ozone layer depletion, the ultraviolet rays reaches earth and causes certain ill-effects which are bad for us and for crops. Exposure to U-V rays can lead to greater incidence of skin cancer, cataracts and damages to the eye and immune deficiency. **1**

Two steps to limit this damage are :

(i) Minimizing the use of CFCs. **1**

(ii) CFC's released into air accumulates in the upper atmosphere and reacts with ozone resulting in reduction in the thickness of the ozone layer. **1**

A **Q. 5. You have been selected to talk on "ozone layer and its protection" in the school assembly on 'Environment Day.'** **[Delhi 31/1/1 2017]**

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

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

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

(b) Conducting poster making competition highlighting effects of ozone layer depletion. 1

Conducting street plays highlighting the ways of environment protection. **1**

[CBSE Marking Scheme, 2017]

Detailed Answer :

(i) Ozone layer helps in shielding the Earth from the harmful UV radiations coming from sun. If ozone layer gets depleted, UV radiations can directly reach the Earth's surface and drastically affect the life on Earth.

(ii) Ozone layer can be protected by :

(a) Stopping the release of Chlorofluorocarbon

(b) Removing the pollutant nitrogen monoxide

(c) Reduce the usage of air conditioners. **1+2**

A **Q. 6. Explain how carbon dioxide and ozone layer of the atmosphere are important to life.**

Ans. Importance of carbon dioxide gas : Carbon dioxide gas shows greenhouse effect and maintains the atmospheric temperature suitable for life on earth. It keeps the air hot.

Importance of ozone layer : Ozone layer in the atmosphere absorbs the harmful radiations. Ultra–violet radiations, coming from sun prevents the life on earth from their harmful radiations that cause skin cancer, damage the new cells and create chromosomal disorder in the livings. **1½+1½**

U **Q. 7. When did the amount of Ozone in the atmosphere begin to drop sharply ? Why did this happen ? How was this problem taken care of by UNEP ?**

Ans. The amount of Ozone in the atmosphere began to drop sharply in the 1980s. **1**

This decrease is due to the synthetic chemicals like chlorofluorocarbons which are used as refrigerants and in fire extinguishers. **1**

In 1987, United Nations Environment Programme, (UNEP) succeeded in forging an agreement to freeze CFC production at 1986 levels. **1**

A **Q. 8. What are the problems caused by the non-biodegradable wastes that we generate ?** **[NCERT] [DDE 2017]**

Ans. (i) They cause biomagnification and increases pollution. **1**

(ii) They make environment unclean. **1**

(iii) They kill useful micro-organisms. **1**

U **Q. 9. 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.**

[Board Term II, O.D. Set I, 2015]

Ans. Difference between biodegradable and non–biodegradable substances : **[DDE 2017]**

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 micro-organisms.	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.
(ii)	Examples : Domestic waste products, sewage.	Examples – DDT and polythene 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 incineration. Incinerators transform the waste into ashes. **2+1**

A **Q. 10. It is the responsibility of the government to arrange for the management and disposal of waste. As an individual you have no role play. Do you agree ? Support your answers with two reasons.**

Ans. I do not agree. As an individual, I also have the responsibility and can contribute in the following ways : (i) Cut down waste generation. (ii) Make compost pit for bio-degradable waste. (iii) Recycle non biodegradable waste. **1+1+1**

A **Q. 11. Explain why the use of plastic bags are banned in many places ? What could be more environment-friendly alternative ?**

Ans. Plastic is a non-biodegradable substance. **1**

Hence a plastic bag will persist in the environment and lead to several environmental problems. 1

It would be better to use paper bags or cloth bags instead of polythene bags. 1

A **Q. 12. How can you help in reducing the problem of waste disposal ? Give any two methods.**

Ans. We can help in reducing the problem of waste disposal in the following ways :

(i) Biodegradable waste should be used to obtain biogas and manure.

(ii) The wastes from industries should be treated at the plant–site before disposal. 1+1+1

A **Q. 13. Give reasons :**

(i) Kulhads have been banned for serving tea on platform.

(ii) Decomposers are not included in any food chain.

(iii) Producers are transducers of energy.

Ans. **(i)** As the top layer of soil is used up in making kulhads, it leads to infertility of the soil.

(ii) As decomposers, *e.g.,* bacteria and fungi act on all trophic levels when the organisms occupying that level dies.

(iii) Producers are green plants, so they can convert solar energy into chemical energy in the form of food molecules. 1+1+1

Long Answer Type Questions

(5 marks each)

U **Q. 1. What are chlorofluorocarbon ? How are they responsible for causing ozone hole in atmosphere? What will be the consequences of ozone hole ?**

Ans. Carbon compounds which contain chlorine and fluorine are called CFCs (chlorofluorocarbons). *e.g.,* CCl_2F_2 (Dichlorodifluoromethane). They lead to depletion of ozone layer causing ozone hole. (Nitric oxide also reacts with ozone to form NO_2 and O_2. CFCs (Chlorofluorocarbons) react with ozone in stratosphere and depletes ozone.

(i) It may lead to skin burns.

(ii) It may cause skin cancer. 1+2+2

A **Q. 2. A non-biodegradable toxic chemical has entered into the food chain. Which type of food habit will you suggest to a man, vegetarian or non-vegetarian. Explain with the help of a food chain. The food chain which you would suggest, is advantageous in an another aspect. How ?**

Ans. Vegetarian food chain will be suggested in case of entry of non-biodegradable toxic chemical into the food chain.

Non-biodegradable chemical gets concentrated at every trophic level by the process of biological concentration. As the concentration increases with the number of trophic level in a food chain, man will get high concentration of the chemical in non–vegetarian food chain than in a vegetarian food chain. Example :

Vegetarian food chain :

Plants ⟶ Man
5 PPM 240 PPM
of DDT of DDT

Non-vegetarian food chain :

Plants ⟶ Goat ⟶ Man
5 PPM 240 PPM 1600 PPM
of DDT of DDT of DDT

Vegetarian food chain is advantageous in terms of energy available to man because it has less number of trophic level. As 90% of energy is lost to the environment, at every level lesser number of trophic level will result in lesser energy loss. 3 +2

High Order Thinking Skills (HOTS) Questions

Q. 1. Why do harmful chemicals concentrate as we go up in a food chain ? [DDE 2017] 3

Ans. Harmful chemical concentrate in the trophic levels of food by the process of biological concentration or bio-magnification. The process of entry of a non–biodegradable chemical into a food chain and its getting accumulated at successive trophic levels, reaching the maximum quantity in the top most level is biological magnification. 3

Q. 2. With the knowledge of energy transfer in the food chain, man can place himself at an advantageous position in the food chain. Explain. 5

Ans. When man places himself close to the producers, he gets more calories. Lower the distance from producer level, lesser the amount of calories available. This is due to the fact that at every trophic level 90 percent of energy is lost to the environment. *e.g.,* 2

(i) Two step food chain

$$\text{Producers} \xrightarrow[1000\,\text{J.}]{} \text{Man}$$

(ii) Three step food chain

$$\text{Producers} \xrightarrow[10{,}000\,\text{J.}]{} \text{Goat} \xrightarrow[1000\,\text{J.}]{900\,\text{J heat}} \text{Man}$$ 3

Q. 3. Why are green plants called producers ? 3 [DDE 2017]

Ans. Green plants are also called producers because only they can synthesize organic food from inorganic raw materials with the help of solar energy in the process of photosynthesis. This food is not only used by green plants but also by other organisms called consumers. 3

Q. 4. (i) What is biological magnification ?

(ii) If the concentration of DDT is 0·2 ppm in water of lake, what would be its likely concentration in fish in the food chain ?

Plankton → Fish → Fish eating birds. 5

Ans. (i) Biological Magnification : The increase in the concentration of a chemical per unit weight of the organisms with the successive rise in tropic level. 2

(ii) Water → Plankton → Fish → Fish eating bird
(0.2ppm.) (5.0ppm) (240ppm)

Concentration in Fish would be approximately 240 ppm. 3

Q. 5. Why are bacteria and fungi called decomposers ?3

Ans. Most of the bacteria and fungi are saprophytes. They obtain their nourishment from organic remains. For this they secrete digestive enzymes over the remains. The remains are converted into soluble absorbable form. This results in decomposition of organic matter. Therefore, bacteria and fungi are called decomposers. 3

Q. 6. The use of pesticide DDT is discouraged since this chemical is found in human body. How does this chemical enter our body ? 3

Ans. DDT enters through the food chain into the human body by the process called biomagnification or biological concentration. DDT is a non–biodegradable chemical that remains toxic in the soil for a long time, absorbed by the plants and thus, enters into the food chain. It gets accumulated at every successive trophic level reaching maximum quantity in the top–most trophic level. 3

Q. 7. Explain why there are greater chances of accumulation of harmful chemical in the body of human beings. 3

Ans. Man is at the top of most food chains and hence, due to biological magnification there are greater chances of accumulation of harmful chemicals in the body. 3

Q. 8. If all the waste we generate is biodegradable, will this have no impact on the environment ?

[NCERT] 3

Ans. If all the waste we generate is biodegradable, impact on the environment will be minimum. The environment will be affected in making and extracting the raw-material used in their manufacture. 3

Q. 9. Why are some substances biodegradable and some non-biodegradable ? 5

Ans. Substance which can be degraded and disposed off naturally by saprophytic organisms or decomposers are called biodegradable, *e.g.,* organic remains, garbage, sewage, livestock waste. Substances which cannot be degraded by saprophytes are known as non-biodegradable. They are mostly man-made articles like pesticides, plastic, polythene etc. Biodegradable articles are formed naturally in biosphere. Decomposer organisms feed on them by secreting digestive juices and absorbing the solubilised substances. Biogenetic nutrients are released in the process called mineralization. 5

Q. 10. "Damage to the ozone layer is a cause of concern." Justify the statement. Suggest any two steps to limit this damage. 5

Ans. Cause of Concern : Ozone layer present in the stratosphere has thinned out by about 8% over the equator and more so over the Antarctica where a big ozone hole appears every year. This has increased the level of UV-B radiations reaching the earth by 15-20 %. These radiations are causing increased number of skin cancers, cataracts and reduced immunity in human beings. These causes increased incidence of blindness of animals, death of young ones, reduced photosynthesis, higher number of mutations and damage to articles. 3

Steps to Limit Damage : (i) Ban on the production and use of halons.

(ii) Ban on production and use of chlorofluorocarbons. **1+1=2**

Q. 11. What are the advantages of cloth bags over plastic bags during shopping ? [NCERT Exemplar] 5

Ans. Advantages of cloth bag :

(i) Cloth bags are stronger and more durable as compared to plastic bags.

(ii) They are washable.

(iii) They can be used repeatedly.

(iv) Cloth bags do not pollute environment.

(v) They are made of biodegradable material which can be recycled. 5

Value Based Questions

Q. 1. The activities of man had adverse effects on all forms of living organisms in the biosphere. Unlimited exploitation of nature by man has disturbed the delicate ecological balance between the living and non-living components of the biosphere. The unfavourable conditions created by man himself threatened the survival not only of himself but also of the entire living organisms on the mother earth. One of your classmates is an active member of 'Eco club' in which he is creating environmental awareness amongst the school students, spreading the same in the society and also working hard for preventing environmental degradation of the surroundings.

(a) Why is it necessary to conserve our environment ?

(b) State the importance of green and blue dust-bins in the safe disposal of the household waste.

(c) List two values exhibited by your classmate who is an active member of Eco-club of your school. 3

[Board Term II, O.D. Set I, 2016]

Ans. Two reasons for the conservation of the environment :

(a) (i) To save air, water and soil from pollution.

(ii) To maintain ecological balance in nature. $2 \times ½ = 1$

(b) Green dustbins for biodegradable waste, and blue dustbins for non-biodegradable waste are meant for proper disposal of waste without wasting time and energy in segregating the biodegradable and non-biodegradable wastes. $2 \times ½ = 1$

(c) Values : cooperative spirit, concern about environment, civic sense or any other. **(Any two)** $2 \times ½ = 1$

[CBSE Marking Scheme, 2016]

OR

[Topper Answer, 2016]

Q.2. Your school was awarded best eco-friendly school award due to the efforts of eco club of your school.

(a) List any two activities that helped eco club to win this award. 1

(b) Mention the values displayed by members of eco club. [Board Term II, Set 8XSVHLC, 2014] 2

Ans. (a) Planting trees, reducing the use of non-renewable sources of energy, saving water, proper garbage disposal, less use of chemicals, cleaning society. **(Any two)**

(b) (i) The members appreciate the fact that rational use of natural resources is their responsibilities towards saving the nature for future generations as well.

(ii) Members are nature lovers and eco-friendly. 1+2

Q.3. Your uncle has come from the village to renew the contract to supply frogs to the laboratories of the colleges of the town. While talking to you, he mentioned that cases of malaria has increased in the village this year. In addition, population of grasshoppers has also increased who are damaging the crop.

(i) What can be the reasons for the problem faced by the villagers ? 1

(ii) What do you learn from the incident ? 1

(iii) What suggestions will you give to your uncle ? 1

Ans. (i) Due to large scale removal of frogs, the population of frogs got reduced in the village. Due to absence of frog in food chain, grasshopper / mosquitoes – frog – snake, the population of grasshoppers and mosquitoes have gone up. Mosquitoes are the carriers of malaria vector and grasshoppers damage the crop. 1

(ii) Every organism has a very important role in nature and we should not disturb this food chain artificially. If one link is removed from the food chain, the whole chain gets disturbed and new problems arises. 1

(iii) I will request him not to renew his contract for supply of frogs with the colleges. This will increase the frog population and population of mosquitoes and grasshoppers will decrease and a balance will be attained soon. 1

Q.4. Food chain is a sequence of organisms through which energy is transferred in the form of food by the process of one organism consuming the other. It shows the relationship of producer and consumer, *i.e.*, 'who eats whom'. Thus it is a series of organisms taking part at various biotic levels from the producer and ends in consumer.

(i) Why are green plants known as producers ? 1

(ii) 'Man is only a consumer'. Justify the statement by giving any two reasons. 2

Ans. **(i)** Green plants have chlorophyll in their leaves due to which they can synthesize their own food in sunlight. 1

(ii) Consumers are the organisms which depend on others for their survival, or food. Consumers are herbivores, carnivores or omnivores. Man is omnivore which depend on others for its food either plants or flesh. 2

Q. 5. Biomagnification is the progressive increase in concentration of harmful non-biodegradable chemical per unit weight of the organisms with the successive rise in different trophic levels in a food chain.

Harmful non-biodegradable chemicals include pesticide such as DDT and heavy metals such as mercury, arsenic, nickel, cadmium etc. The harmful chemicals get biomagnified in a food chain and affect the human beings and other biotic components of the environment. In a food chain :

Water → Plankton → Fish → Fish eating bird, if DDT enters, its concentration shall increase from plankton to fish.

(i) Name the trophic level where biomagnification is maximum. 1

(ii) "Biomagnification, the cause, effects and prevention". Give any three talk mentioned by environmentalist on the topic. 2

Ans. **(i)** Biomagnification is maximum in fourth trophic level *i.e.*, fish. 1

(ii) **(a)** Caused by the use of several pesticides and chemicals for crop protection and storage.

(b) It harms the trophic level and causes toxicity and death.

(c) It can be prevented by minimising the use of chemicals in food productivity. 1 + 1

Q. 6. After the examination, 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 your opinion, is burning plastic an eco–friendly method of waste disposal ? Why ? State the advantage of method suggested by Rakesh. 1

(b) How can we contribute in maintaining the parks and roads neat and clean ? 2

Ans. **(a)** Burning of plastic is a curse to environment because it pollutes the environment by liberating toxic and poisonous gases. Rakesh suggested to separate biodegradable and non-biodegradable recyclable and non-recyclable wastes so that compost can be prepared from kitchen wastes or fruits peels and there should be a safe disposal of plastics. This makes our environment clean. 1

(b) **(i)** We should not throw the empty packets on roads or parks. 2

(ii) Garbage should be thrown in the dustbins.

(iii) Plastic bags should be disposed safely.

Q. 7. Ayush went to Puri in Orissa on a holiday recently. There are lots of tourists in the beach and the beach was very dirty with plastic, paper, waste food, mineral water bottle, etc.

Ayush decided to do something to save the beach.

(a) What can Ayush do to save the beach from becoming a dumping ground ?

(b) How can government help in keeping the beach clean ? 3

Ans. **(a)** Ayush can make few banners requesting tourists to keep the beach clean and put it in different locations at the beach. He can also mobilise a few volunteers from local people to start a cleanliness drive on the beach. The volunteers should be motivated to do the cleanliness drive once or twice every month. 1½

(b) The government can enforce law to prevent people from throwing items on the beach. Designated place should be kept for eating at the beach. Garbage bins should be placed at proper distances for easy waste disposal. 1½

Q. 8. The ozone layer is a layer of the earth's atmosphere in which most of the atmosphere's ozone is concentrated. It protects the earth from harmful radiation like high energy U-V radiations from passing through it. Protective role of the ozone layer in the upper atmosphere is so vital that scientists believe life on earth probably would not have evolved and could not exist today without it. In 1970's, scientist discovered that chemicals known as chlorofluorocarbons (CFCs) can reach the stratosphere and destroy the ozone gas. In 1985, scientist discovered that every year, the ozone layer over Antarctica becomes drastically thinner during southern hemisphere spring, which forms a 'Ozone hole' over Antarctica.

(i) Name any four appliances which release chlorofluorocarbons in the atmosphere. 1

(ii) 'Damage to the ozone layer is a cause for concern.' Justify this statement. Suggest any three steps to limit this damage. 2

Ans. (i) Four appliances which releases Chlorofluorocarbon are :

(a) Aerosol spray
(b) Air conditioner
(c) Refrigerator
(d) Coolant **1**

(ii) Exposure to U-V rays can lead to greater incidence of skin cancer, cataracts or other damages to the eye and immune deficiency. **1**

Three steps to limit this damage are :

(a) Stop the release of Chlorofluorocarbon
(b) Removing the pollutant nitrogen monoxide
(c) Reduce the usage of air conditioners **1**

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