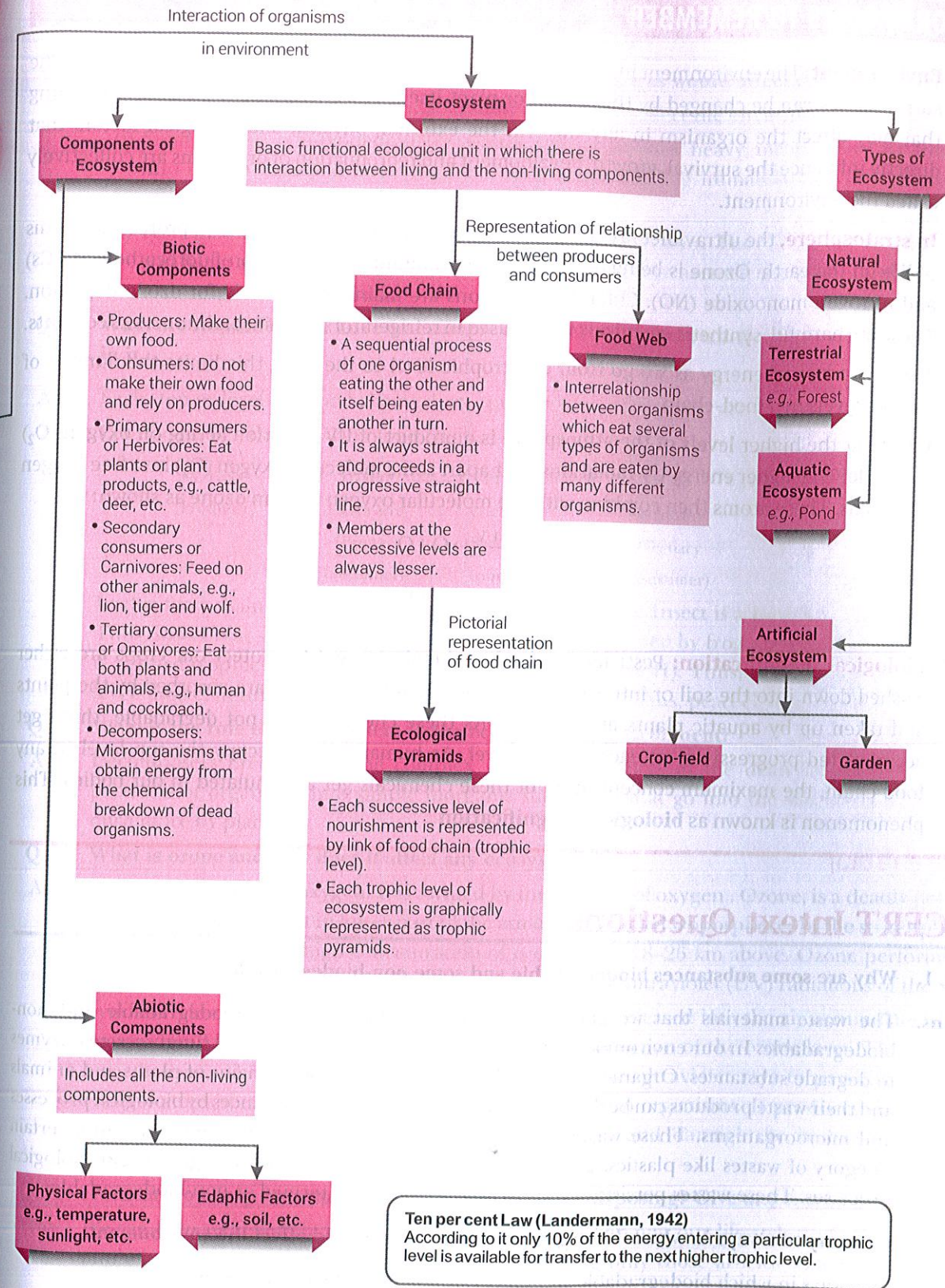
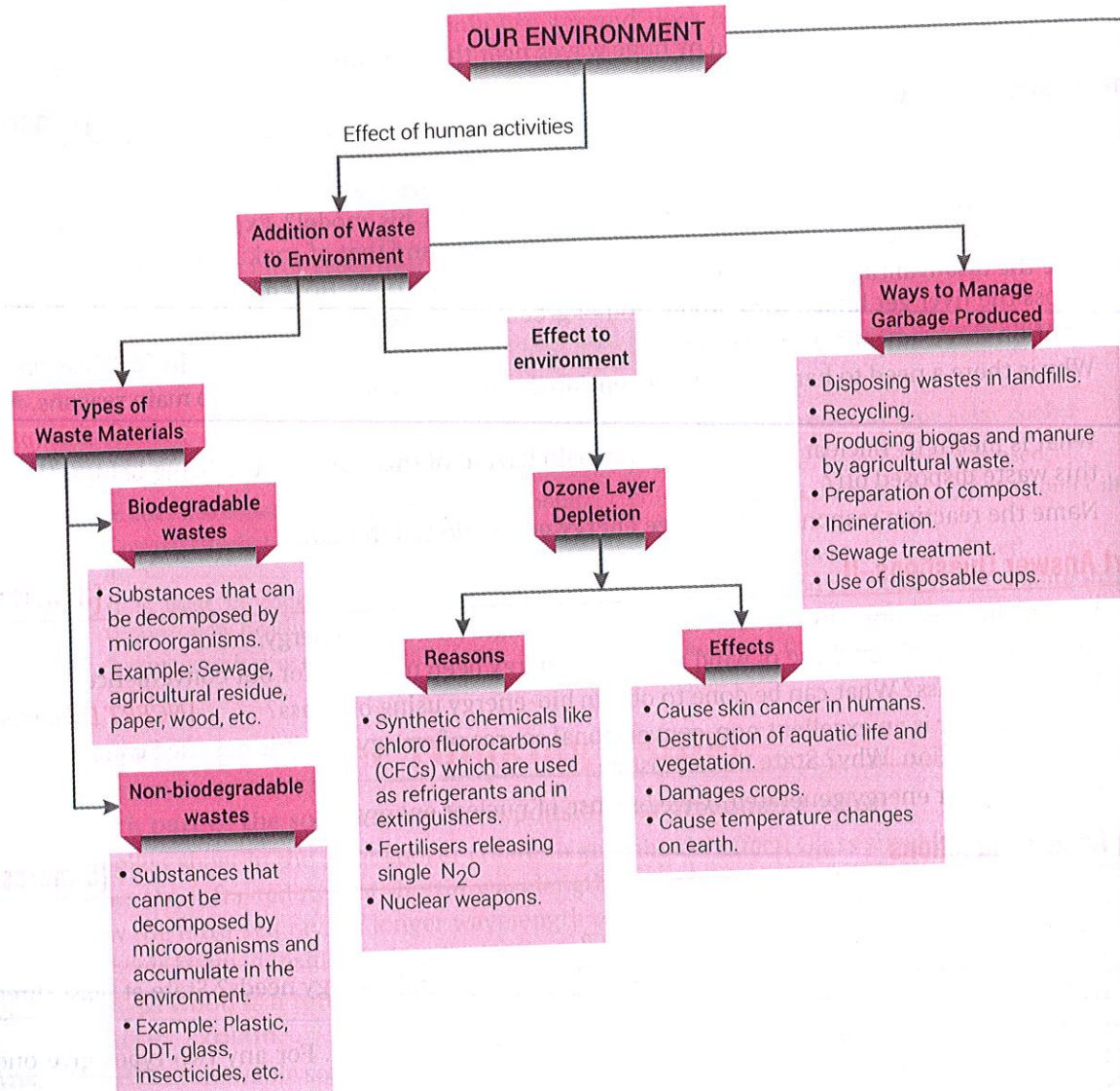


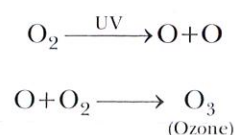
BASIC CONCEPTS – A FLOW CHART



**Ten per cent Law (Landermann, 1942)**  
According to it only 10% of the energy entering a particular trophic level is available for transfer to the next higher trophic level.

## MORE POINTS TO REMEMBER

- ❑ **Environment:** The environment includes the surroundings of the organisms where they reside. The surroundings can be changed by the animal or plant itself. The environment includes everything that may affect the organism in any way. All the external, physical and biological factors that directly influence the survival, growth, development and reproduction of organisms are collectively called the environment.
- ❑ **In stratosphere,** the ultraviolet rays (UV) are absorbed by the ozone layer which protects all forms of life on the earth. Ozone is being depleted by air pollutants such as chlorofluorocarbons (CFCs) and nitrogen monoxide (NO). Chlorofluorocarbons are mainly responsible for ozone depletion. These are harmful, synthetic chemicals widely used in refrigerators and air conditioners as coolants.
- ❑ There is a loss of energy as we go from one trophic level to the next, this limits the number of trophic levels in a food-chain.
- ❑ **Ozone** at the higher levels of the atmosphere is a product of UV radiation acting on oxygen ( $O_2$ ) molecule. The higher energy UV radiations split apart some molecular oxygen ( $O_2$ ) into free oxygen (O) atoms. These atoms then combine with the molecular oxygen to form ozone as shown:



- ❑ **Biological magnification:** Pesticides and other chemicals used to protect our crops are either washed down into the soil or into the water bodies. From there these are absorbed by the plants and taken up by aquatic plants and animals. As these chemicals are not degradable, these get accumulated progressively at each trophic level. As human beings occupy the top level in any food chain, the maximum concentration of these chemicals get accumulated in our bodies. This phenomenon is known as **biological magnification**.

## NCERT Intext Questions

**Q. 1. Why are some substances biodegradable and some non-biodegradable?**

**Ans.** The waste materials that we generate in our daily life are either biodegradable and non-biodegradable. In our environment, microorganisms such as bacteria and fungi secrete enzymes to degrade substances. Organic compounds, present in the dead remains of plants and animals and their waste products can be degraded into simpler harmless substances by biological processes and microorganisms. These wastes are termed as biodegradable. On the other hand, certain category of wastes like plastics, glass, etc. cannot be degraded by microorganisms or biological processes. These wastes persist in the environment and are termed as non-biodegradable.

**Q. 2. Give any two ways in which biodegradable substances would affect the environment.**

**Ans.** Two ways in which biodegradable substances would affect the environment are:

- (i) Decomposition of biodegradable wastes produces foul smell which spreads in the environment and makes the life of people miserable.

- (ii) Flies breed at huge heaps of biodegradable wastes carrying the germs and spread diseases such as typhoid, diarrhoea, tuberculosis, cholera, etc.

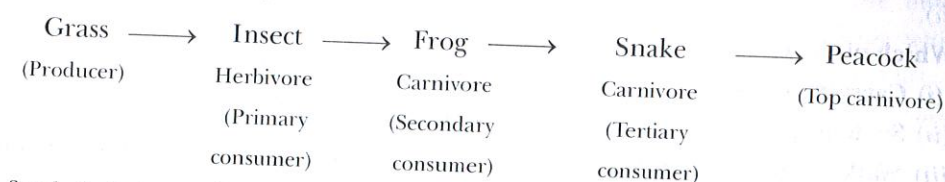
**Q. 3. Give any two ways in which non-biodegradable substances would affect the environment.**

**Ans.** Two ways in which non-biodegradable substances would affect the environment are:

- (i) Some of the non-biodegradable wastes (pesticides and heavy metals) convert the land into barren land and enter the food chain thus, affecting human beings and other biotic components of the environment.
- (ii) Pesticides and other chemicals enter water and food chains. They affect the fertility of soil and harm all kind of living organisms. Human beings are harmed the most because they are at the top of the food chain.

**Q. 4. What are trophic levels? Give an example of a food chain and state the different trophic levels in it.**

**Ans.** Each step or level of a food chain where transfer of energy occurs are called trophic levels. Let us consider the following food chain.



In this food chain, grass is a producer (first trophic level). Insect is a herbivore and eats grass. Thus, insect is at second trophic level. Insect, in turn, is eaten by frog (carnivores I). Thus, frog is at third trophic level. Frog, is eaten by snake (carnivores II). Thus, snake is at fourth trophic level. Snake, in turn is eaten by peacock (carnivores III). Thus, peacock is at fifth trophic level.

**Q. 5. What is the role of decomposers in the ecosystem or environment?**

[NCERT Exemplar]

**Ans.** Decomposers break down the complex organic substances in the dead remains and waste products of organisms into simple inorganic substances that go into the soil and are used up once more by plants.

**Q. 6. What is ozone and how does it affect any ecosystem?**

[CBSE (F) 2015]

**Ans.** Ozone is an isotope of oxygen. It is formed by three atoms of oxygen. Ozone, is a deadly poison. Very little of it is present in lower part of the atmosphere called troposphere. In the stratosphere, ozone layer comprises high concentration of ozone some 18–26 km above. Ozone performs an essential function. It shields the surface of the earth from ultraviolet (UV) radiations of the Sun. Synthetic chemicals such as chlorofluorocarbons (CFCs) released into the air accumulate in the upper atmosphere and react with ozone resulting in reduction of the ozone layer. Thus, ozone layer becomes thinner and gets depleted allowing more ultraviolet rays to pass through the earth's, atmosphere. This radiation is highly damaging to organisms. It produces skin cancer, damage eyes including increased incidence of cataract and damage the immune system of human beings and other animals.

**Q. 7. How can you help in reducing the problem of waste disposing? Give any two methods.**

**Ans.** We can help reducing the waste disposal problem by changing our life style and attitude. If we minimise the use of disposable articles and start using only those articles which can easily be recycled, the quantity of waste can be reduced.

**1. Non-biodegradable waste:** Most often the non-biodegradable waste is recycled. It is taken away by rag-pickers.

**2. Biodegradable waste:** Biodegradable waste is putrescible. It can be composted or vermicomposted to prepare compost for our kitchen gardens..

Some prominent methods of waste disposal are land fills, production of bio-gas and manure, and incineration.

## NCERT Exercises

**Q. 1. Which of the following groups contain only biodegradable items?**

- (i) Grass, flowers and leather                      (ii) Grass, wood and plastic  
(iii) Fruit-peels, cake and lime-juice              (iv) Cake, wood and grass.

**Ans.** (i), (iii) and (iv).

**Q. 2. Which of the following constitute a food chain?**

- (i) Grass, wheat and mango                      (ii) Grass, goat and human  
(iii) Goat, cow and elephant                      (iv) Grass, fish and goat

**Ans.** (ii).

**Q. 3. Which of the following are environment-friendly practices?**

- (i) Carrying cloth-bags to put purchases in while shopping.  
(ii) Switching off unnecessary lights and fans.  
(iii) Walking to school instead of getting your mother to drop you on her scooter.  
(iv) All of the above.

**Ans.** (iv).

**Q. 4. What will happen if we kill all the organisms in one trophic level?**

**Ans.** If we kill all the organisms in one trophic level, the transfer of food energy to next level will stop. Also, there will be overpopulation of individuals belonging to the previous trophic level. The organisms of higher trophic level will also die. Hence, it will result in imbalance in the ecosystem.

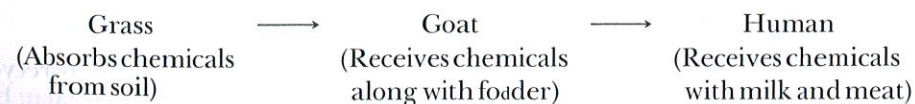
**Q. 5. Will the impact of removing all the organisms in a trophic level be different for different trophic levels? Can the organisms of any trophic level be removed without causing any damage to the ecosystem?**

**Ans.** Removal of all the organisms in a trophic level will cause the same type of disturbance in an ecosystem, i.e., killing of higher trophic level and explosion in population of the lower level organisms. If all producers are killed, there will be no food available for herbivores present in the ecosystem. In the absence of herbivores, various categories of carnivores will be affected. Since, all categories of organisms are linked through a food chain, removal of organisms of any trophic level will ultimately affect the ecosystem.

**Q. 6. What is biological magnification? Will the levels of this magnification be different at different levels of the ecosystem?**

**Ans.** The increase in concentration of harmful chemical substances (pesticides) in the body of living organisms at each trophic level of a food chain is called biological magnification.

The concentration of harmful chemicals will be different at different trophic level, because the animals at the highest trophic level or at the extreme right side of the food chain will have the maximum concentration of harmful chemicals in the body, and grass which is at the lowest trophic level will have minimum concentration of harmful chemicals.



**Q. 7. What are the problems caused by the non-biodegradable wastes that we generate?**

- Ans.** The problems caused by the non-biodegradable wastes that we generate are:
- (i) The non-biodegradable wastes cannot be decomposed by microorganisms like bacteria. So, the volume of these wastes will not decrease creating the problem of their disposal.
  - (ii) They have to be dumped on land. Hence, the land becomes unfit for other purposes.
  - (iii) Heavy metals present in industrial waste like copper, lead, nickel, mercury remain in the soil indefinitely. Slowly, they pass into vegetation and crops and thus harm both humans and animals.
  - (iv) Pesticides and other toxins pollute underground water, surface water and soil. The chemicals enter food chain thereby harming animals and humans, and the soil may become acidic or alkaline.
  - (v) In the process of removing recyclable materials from solid wastes, the rag-pickers are exposed to many diseases and toxins.

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

**Ans.** If all the waste we generate is biodegradable, it will have impact on the environment. Biodegradable wastes pollute the environment only when the amount is large which cannot be degraded (or decomposed) into harmless substances in nature at the right time. Thus, the impact on the environment will depend upon the system of collecting, transporting and disposal of biodegradable waste.

**Q. 9. Why is damage to the ozone layer a cause for concern? What steps are being taken to limit this damage?**

**Ans.** Ozone layer is very important for the existence of life on earth because it absorbs most of the harmful ultraviolet radiation coming from the Sun and prevents them from reaching the earth. The ultraviolet radiations have extremely harmful effects on human beings, other animals as well as plants. For example, ultraviolet rays can cause skin cancer. They also damage the eyes by causing an eye disease called cataract. Ultraviolet rays damage immune system by lowering the body's resistance to diseases. Thus, ozone layer in upper atmosphere protect us from these diseases by absorbing ultraviolet rays coming from the sun.

This decrease has been linked to synthetic chemicals like chlorofluorocarbons (CFCs) which are used as refrigerants and in fire extinguishers. In 1987, the United Nations Environment Programme (UNEP) succeeded in forging an agreement to freeze CFC production at 1986 levels. By developing substitutes to freeze CFCs; scientists have already developed some substitutes which are ozone friendly.

## VERY SHORT ANSWER QUESTIONS

[1 mark]

**Q. 1. Why is it necessary to conserve our environment?**

**Ans.** It is necessary to conserve our environment in order to maintain ecological balance.

**Q. 2. What is a biodegradable substance?**

**Ans.** Biodegradable substances are the substances that are broken down by biological processes. [CBSE (C) 2017]

**Q. 3. Name any two biodegradable and two non-biodegradable pollutants.**

**Ans.** Biodegradable: domestic sewage and wood  
Non-biodegradable: Plastic and DDT

**Q. 4. We often use the word environment. What does it mean?**

**Ans.** Environment is the physical, chemical and biological conditions of the region. [CBSE (F) 2016]

Q. 5. Which two of the following are biodegradable?

Tomato leaves, aluminium wire, synthetic fibre and wool

Ans. Tomato leaves and wool.

Q. 6. Which of the following are non-biodegradable?

Wool, glass, silver foil and leather

Ans. Glass and silver foil.

Q. 7. What is the function of ozone in the upper atmosphere?

[CBSE Delhi 2015]

Ans. Ozone shields the surface of the earth from ultraviolet rays of the Sun.

Q. 8. Why should biodegradable and non-biodegradable wastes be discarded in two separate dustbins?

[CBSE Delhi 2015]

Ans. Biodegradable and non-biodegradable wastes should be discarded in two separate dustbins so that the time and energy required in segregation may be saved and waste may be disposed off quickly.

Q. 9. What are the two main components of our environment?

Ans. The two components are biotic or living and abiotic or non-living component.

Q. 10. List two biotic components of a biosphere.

[CBSE Delhi 2016]

Ans. Producers, consumers and decomposers are the biotic components of a biosphere. (Any two)

Q. 11. Name any two abiotic components of an environment.

Ans. Abiotic components of an environment include soil and water.

Q. 12. Name two decomposers.

Ans. Bacteria and fungi

Q. 13. Write an aquatic food chain.

Ans. Phytoplankton  $\longrightarrow$  Zooplankton  $\longrightarrow$  Fish  $\longrightarrow$  Seal  
(Small fish) (Big fish)

Q. 14. 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?

[CBSE (AI) 2015]

Ans. On applying the 10% law to the food chain, the organisms of the 2nd trophic level of the food chain will have  $\frac{10}{100} \times 10,000 = 1,000$  joules of energy.

Q. 15. In the following food chain, plants provide 500 J of energy to rats. How much energy will be available to hawks from snakes?

[CBSE (AI) 2017]

Plants  $\longrightarrow$  Rats  $\longrightarrow$  Snakes  $\longrightarrow$  Hawks

Ans. On applying the 10% law to the food chain,

$$\begin{aligned} \text{Energy available to snakes from rats} &= 10\% \text{ of } 500 \\ &= \frac{10}{100} \times 500 = 50 \text{ J} \end{aligned}$$

So, energy available to hawks from snakes = 10% of 50 J

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

Q. 16. Draw a food chain with four trophic levels.

Ans. Plants  $\longrightarrow$  Rats  $\longrightarrow$  Snakes  $\longrightarrow$  Hawks

Q. 17. The first trophic level in a food chain is always a green plant. Why?

[CBSE (AI) 2015]

OR

Why do producers always occupy the first trophic level on every food chain?

[CBSE (F) 2016]

Ans. The first trophic level is always a green plant because only plants can utilise the radiant energy of the sun and transform it to chemical form during photosynthesis.

Q. 18. Which of the following are always at the second trophic level of food chains?

Carnivores, Autotrophs, Herbivores

[CBSE (AI) 2015]

Ans. Herbivores are always at the second trophic level of food chains.

Q. 19. 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

[CBSE (F) 2015]

Ans. Hawk will have the highest concentration of non-biodegradable chemicals.

The phenomenon associated is biomagnification.

Q. 20. State the essential function performed by ozone at the higher levels of the atmosphere.

[CBSE Delhi (C) 2017]

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

Q. 21. Write the full name of the group of compounds mainly responsible for the depletion of ozone layer.

[CBSE (F) 2015]

Ans. Chlorofluorocarbons

Q. 22. What is an ecosystem?

[CBSE Delhi 2017]

Ans. A unit of biosphere in which biotic and abiotic components interact with each other is an ecosystem.

Q. 23. Why is forest considered a natural ecosystem?

[CBSE Delhi 2017]

Ans. A forest is a self-sustaining system, so it is considered as a natural ecosystem.

Q. 24. List two examples of natural ecosystem.

[CBSE (F) 2017, 2015, Delhi 2016]

Ans. Forests, ponds, lakes are examples of natural ecosystem. (Any two)

Q. 25. Name any two man-made ecosystems.

[CBSE (F) 2017]

Ans. Crop fields, Gardens, Aquarium, Parks (Any two)

Q. 26. Why are green plants called producers?

[CBSE Delhi 2016]

Ans. Green plants are called producers because they prepare food by photosynthesis using solar energy.

Q. 27. List four common waste disposal methods.

Ans. Compost, recycling of wastes, landfills and incineration.

Q. 28. What is incineration?

Ans. Incineration means 'reducing to ashes'. The burning of substances at high temperature to form ash is called incineration.

Q. 29. Why is improper disposal of waste a curse to environment?

[NCERT Exemplar]

Ans. Wastes pollute our environment, air, soil and water, and cause harmful effects on all living organisms.

**Q. 30. The depletion of ozone layer is a cause of concern. Why?** [CBSE (AI) 2016]

**Ans.** Ozone layer is very important for the existence of life on earth because it prevents harmful ultraviolet (UV) radiations coming from the Sun to reach the earth.

**Q. 31. What destructive effect do chlorofluorocarbons bring about in the atmosphere?**

**Ans.** CFCs deplete ozone from ozone shield, resulting in increasing the passage of harmful ultraviolet radiation to the earth.

**Q. 32. Write one negative effect, on the environment, of affluent lifestyle of few persons of a society.**

[CBSE (AI) 2016]

**Ans.** Affluent lifestyle results in:

- (i) generation of excessive waste materials.
- (ii) Excessive use of natural resources like coal and petroleum which causes pollution.
- (iii) Use of excessive non-biodegradable material in packaging. (Any one)

### SHORT ANSWER QUESTIONS-I

[2 marks]

**Q. 1. Why are crop fields known as artificial ecosystems?**

[NCERT Exemplar]

**Ans.** Crop fields are man-made and some biotic and abiotic components are manipulated by humans. Therefore, they are known as artificial ecosystems.

**Q. 2. Suggest one word for each of the following statements/definitions:**

- (i) The physical and biological world where we live in.
- (ii) Each level of food chain where transfer of energy takes place.
- (iii) The physical factors like temperature, rainfall, wind and soil of an ecosystem.
- (iv) Organisms which depend on the producers either directly or indirectly for food.

[NCERT Exemplar]

**Ans.** (i) Environment/biosphere (ii) Trophic level  
(iii) Abiotic factors (iv) Consumers/heterotrophs

**Q. 3. What are decomposers? What will be the consequence of their absence in an ecosystem?**

[NCERT Exemplar]

**Ans.** Decomposers break down the complex organic substances of garbage, dead animals and plants into simpler inorganic substances that go into the soil and are used up again by the plants in the absence of decomposers recycling of material in the biosphere will not take place.

**Q. 4. Give two examples of decomposers. State their important role in nature.** [CBSE Delhi (C) 2017]

**Ans.** Bacteria and fungi are decomposers because bacteria and fungi break down the dead and decaying organic matter into simpler substances and provide the nutrients back to the soil.

**Importance of decomposers in nature are:**

- (i) They act as natural scavengers.
- (ii) They help in recycling of nutrients.

**Q. 5. Consider the food chain: Grass → Deer → Lion. What will happen if lions are removed from the above food chain?**

**Ans.** Removal of lions from the above food chain will increase the number of deer to such an extent that they will eat up the whole grass. The density of producer like grass will be very much reduced and this will turn the area into a desert.

**Q. 6. Which of the following belongs to the same trophic level?**

Grass, Hawk, Rabbit, Frog, Deer

**Ans.** Grass is producer, hawk and frog are carnivores (top and lower), rabbit and deer are herbivores. Since rabbit and deer are both herbivores, they belong to the same trophic level.

**Q. 7. Write the common food chain of a pond ecosystem.**

[NCERT Exemplar]

**Ans.** Phytoplanktons and aquatic plants → small aquatic animal larvae and insects → fishes → birds.

**Q. 8. In a lake contaminated with pesticides, which one of the following organism living in the lake will contain the maximum amount of pesticide?**

Small fish, zooplankton, big fish, phytoplankton.

**Ans.** The concentration of pesticide will increase with the rise of trophic level in the food chain.

Phytoplankton → Zooplankton → Small fish → Big fish (maximum pesticide)

Therefore, big fishes will have maximum amount of pesticides.

**Q. 9. What is the percentage of solar energy trapped and utilised?**

**Ans.** 1% in terrestrial habitats and 0.2% in aquatic ecosystems is the percentage solar energy trapped and utilised.

**Q. 10. Why does a food chain consist of only three to four steps?**

**Ans.** On an average, only 10% of the food available to a trophic level is transferred to the next trophic level. Since, the amount of available energy keeps on becoming less as we move to higher trophic levels, so very little usable energy remains after four trophic levels. That is why a food chain consists of only three to four steps.

**Q. 11. With the help of an example explain how indiscriminate use of pesticides may result in the degradation of the environment.**

**Ans.** Indiscriminate use of pesticides may result in the degradation of the environment. For example, DDT is an organic pesticide which is used to kill pests in crop fields. When it is used in large quantity it can be passed along the food chain from crops to man or other animals and birds and can harm them.

**Q. 12. State any two practices which can help in the protection of our environment.**

**Ans.** Two practices which can help in the protection of our environment are:

- (i) Disposal of the waste after its separation as biodegradable and non-biodegradable material.
- (ii) Judicious use of unleaded petrol and alternate sources of energy.

**Q. 13. What are the by-products of fertiliser industries? How do they affect the environment?**

[NCERT Exemplar]

**Ans.** The harmful by-products are gases such as SO<sub>2</sub> and NO. They cause extensive air pollution and are responsible for acid rain.

**Q. 14. The number of malarial patients in a village increased tremendously when large number of frogs were exported from the village. What could be the cause for this?**

**Ans.** The food chain in the given situation will be:

Phytoplankton → Zooplankton → Mosquito larva → Frogs

In the absence of frogs (as they were exported), more mosquito larvae survived giving rise to large number of mosquitoes. The large number of mosquitoes caused increased incidences of malaria.

**Q. 15. Mention three harmful effects of using polythene bags on the environment. Suggest an effective alternative to these bags.**

[CBSE (F) 2017]

**Ans.** Harmful effects of using polythene bags are:

- (i) Increases soil temperature or adversely effect agricultural products.

- (ii) Land and animals die after consumption of these bags.  
 (iii) It causes clogging of drains and may even cause flood like situation. Alternatives are the use of jute bags, paper bags, cloth bags.

**Q. 16. Why are certain forests considered "biodiversity hot spots"? Suggest any two ways in which an individual can contribute effectively to the management of forests and wildlife. [CBSE (F) 2017]**

**Ans.** Certain forest are considered as "biodiversity hot spots" because in a forest, various species are available to contribute to the management of forests and wildlife are

- (i) Avoiding cutting of trees and killing of animals.  
 (ii) Educating people about the importance of forests and wildlife in sustainance of life on the earth.

**Q. 17. Suggest any two ways by which the balance between the environment and industrial development is maintained so as to help undisturbed survival of the organisms on the Earth. [CBSE (F) 2017]**

- Ans.** (i) Judicious use of forest resources for industrial development.  
 (ii) Waste water generated by industries should be recycled.  
 (iii) Alternative resources to conserve natural resources. (Any two)

### SHORT ANSWER QUESTIONS-II

[3 marks]

**Q. 1. 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. [NCERT Exemplar; CBSE (AI) 2015]**

**Ans.**

S.No.	Biodegradable wastes	Non-biodegradable wastes
(i)	Waste materials which can be broken down into harmless substances in nature in due course of time by the action of microorganisms such as certain bacteria are called biodegradable wastes.	Waste materials which cannot be broken down into harmless substances by the action of microorganisms in nature are called non-biodegradable wastes.
(ii)	<b>Examples:</b> Cattle dung, wool, paper, compost.	<b>Examples:</b> Plastics, polythene bags, metal articles, glass objects.

People should adopt following changes in habit:

- (i) Dispose household waste, chemical waste and hospital waste in a landfill.  
 (ii) Broken plastic articles such as buckets, bowls, cups, plates, etc., should be sent to plastic processing factories.

**Q. 2. Give reason to justify the following : [CBSE (Delhi) 2016]**

- (i) **The existence of decomposers is essential in a biosphere.**  
 (ii) **Flow of energy in a food chain is unidirectional.**

**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, decomposers:

- replenish the soil naturally.
- 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 (i.e., autotrophs) and the energy captured by the autotrophs does not go back to the solar input.

Hence, the flow of energy is unidirectional.

**Q. 3. What is biodiversity? What will happen if biodiversity of an area is not preserved? Mention one effect of it. [CBSE (AI) 2015]**

**Ans.** The variety of life forms found in a particular region forms its biodiversity.

If biodiversity of an area is not preserved, it will result in:

- (i) natural calamities such as floods, forest fires and hurricanes.  
 (ii) soil erosion and desertification because of deforestation.  
 (iii) large-scale habitat losses and extinction of vulnerable animal and plant species.  
 (iv) sudden climatic changes and instability in the functioning of the ecosystem.

The effect of biodiversity loss would be disturbance of ecosystem balance.

**Q. 4. 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. [CBSE (AI) 2015]**

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

Its two main components are:

- (i) Biotic component/living organisms  
 (ii) Abiotic component/physical factors

An aquarium needs to be cleaned regularly because it is an artificial and incomplete ecosystem in which natural decomposers are absent and the water is stagnant. Thus, water do not clean itself in an aquarium.

**Q. 5. "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. [CBSE (F) 2015]**

OR

**Indicate the flow of energy in an ecosystem. Why is it unidirectional? Justify. [NCERT Exemplar]**

**Ans.** 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. The energy captured by the autotrophs does not revert back to the solar input. Thus, energy flow in food chains are said to be unidirectional.

Pesticides used for crop protection when washed away go down into the soil. These pesticides are absorbed by plants which are the producers. On consumption of these plants, the pesticides enter our food chain and being non-biodegradable, these chemicals get accumulated progressively and enter our body.

**Q. 6. Give two differences between food chain and food web. [NCERT Exemplar]**

**Ans.**

Food Chain	Food Web
1. Food chain is a series of organisms feeding on one another. 2. Members of higher trophic level feed upon a single type of organism of the lower trophic level.	1. Food web consists of a number of interlinked food chains. 2. Members of higher trophic level can feed upon organisms of the lower trophic levels of other food chain.

**Q. 7. Why does vegetarian habit help us in getting more energy? In terms of energy who is at an advantageous position (vegetarian or a non-vegetarian)? Why?**

**Ans.** We know that, vegetarians obtain food directly from plants while non-vegetarians get the food from animals. Animals (herbivores) contain 10% of food energy as compared to plants (producers). For example; the same amount of producer which supplies say 1000 J of food

energy to a vegetarian will provide only 100 J of food energy to a non-vegetarian. Hence, a vegetarian will be at an advantageous position.

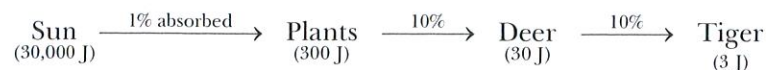
**Q. 8. Calculate the amount of energy available to tiger in the following food chain if plants have 30,000 J of energy available from the Sun:**

Plant  $\longrightarrow$  Deer  $\longrightarrow$  Tiger

**Ans.** Plants can trap only 1% of the Sun's energy falling on them. Now, 1% of 30,000 J is 300 J which is the energy available to plants.

The plants are eaten up by deer. According to 10% law, 10% of 300 J, i.e., 30 J of energy will be available to deer as food.

The deer will transfer 10% of its 30 J energy to the tiger. Thus, the food energy available to the tiger will be 10% of 30 J which is 3 J.



**Q. 9. Give three characteristics of food chain.**

- Ans.**
- A food chain is always straight and proceeds in a progressive straight line.
  - A food chain helps in understanding the food relationship and interactions among various organisms in an ecosystem.
  - It also helps to understand the movement of toxic substances in an ecosystem and the problem of their biological magnification.

**Q. 10. Describe any four modes of disposal of waste.**

- Ans.**
- Disposing of biodegradable wastes in biogas plants so that it can help in the preparation of biogas and manure.
  - Solid wastes should be buried in urban areas as landfills.
  - Some solid wastes (plastic, paper and metals) should be recycled.
  - Large amount of waste must be burnt at high temperature (incineration).

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

- Ans.** Cloth bags:
- are capable of carrying more items.
  - are made of biodegradable material.
  - do not pollute our environment.
  - can be reused.

**Q. 12. How is ozone formed in the upper atmosphere? What causes its damage?**



Certain harmful chemicals such as chlorofluorocarbons (CFCs), are released into the air. These accumulate in the upper atmosphere and react with ozone resulting in reduction of the ozone layer by forming a hole. Thus, ozone layer becomes thinner and gets depleted allowing more ultraviolet rays to pass through the earth's atmosphere. These radiations are highly damaging to organisms and cause skin cancer, damage to eyes including increased incidence of cataract and damage to immune system of human beings and other animals.

## LONG ANSWER QUESTIONS

[5 marks]

**Q. 1. Suggest any five activities in daily life which are eco-friendly.**

- Ans.**
- Separation of biodegradable and non-biodegradable substances
  - Gardening
  - Use of gunny bags/paper bags in place of polythene/plastic bags
  - Use of compost and vermicompost in place of fertilisers
  - Harvesting rainwater

**Q. 2. Name the wastes which are generated in your house daily. What measures would you take for their disposal? [NCERT Exemplar]**

- Ans.**
- Kitchen wastes
  - Paper wastes like newspapers, bags, envelopes
  - Plastic bags
  - Vegetable/fruit peels/rind

**Measures for disposal**

- Segregation of biodegradable and non-biodegradable wastes.
- Safe disposal of plastic bags.
- Vegetable/fruit peels can be placed near trees/plants, which on decomposition will enrich the soil with nutrients.
- Give paper wastes for recycling.
- Prepare a compost pit for kitchen wastes.

**Q. 3. Explain some harmful effects of agricultural practices on environment. [NCERT Exemplar]**

- Ans.**
- Excessive use of fertilisers changes the chemistry of soil and kills useful microbes.
  - Excessive use of non-biodegradable chemical pesticides leads to biological magnification.
  - Extensive cropping causes loss of soil fertility.
  - Excess use of ground water for agriculture lowers the water table.
  - Damage to natural ecosystem/habitat.

## HOTS (Higher Order Thinking Skills)

**Q. 1. Select the mis-matched pair in the following and correct it.**

- Biomagnification** – Accumulation of chemicals at the successive trophic levels of a food chain

**(b) Ecosystem** – Biotic components of environment

**(c) Aquarium** – A man-made ecosystem

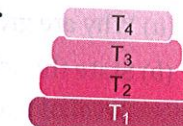
**(d) Parasites** – Organisms which obtain food from other living organisms

**Ans.** (b) is not a matching pair.

Both biotic and abiotic components of environment constitute an ecosystem.

**Q. 2. In the given figure, the various trophic levels are shown in a pyramid. At which trophic level is maximum energy available?**

**Ans.** At T<sub>1</sub>, maximum energy is available because it comprises of the producers.



Q. 3. What will be the direction of energy transfer in each of the following cases?

- (a) Grasshopper is eaten by a frog.
- (b) A deer feeds on grass.
- (c) A deer is eaten by a lion

Ans. (a) primary consumer to secondary consumer.  
(b) producer to primary consumer.  
(c) secondary consumer to tertiary consumer.

## Proficiency Exercise

### Very Short Answer Questions

[1 mark]

1. In the following food chain, grass provides 4000 J of energy to the grasshopper. How much energy will be available to snakes and frogs?

Grass, Grasshopper, Frogs, Snakes

2. In the following food chain, 100 J of energy is available to the lion. How much energy was available to the producer? [CBSE Delhi (C) 2017]

Plants → Deer → Lion

- 3. What is meant by non-biodegradable waste? Identify biodegradable waste from the following: Empty packet of chips, empty plastic bottle of mineral water, empty paper box of sweets, empty tin of a cold drink.
- 4. Name the group of chemical compound which adversely affects the ozone layer.
- 5. In which form do the plants store the trapped solar energy?
- 6. Pesticides added to the field is seen in increased amounts in the crop and in the birds that feed on them. What is this phenomenon called?
- 7. Why is a lake considered to be a natural ecosystem? [CBSE Delhi 2017]

### Short Answer Questions-I

[2 marks]

- 8. Differentiate between biodegradable and non-biodegradable substances. Cite examples.
- 9. Why do all food chains start with plants and have a limited number of trophic levels?
- 10. What is ozone? Name the chemicals that damage the ozone layer. [CBSE Delhi (C) 2017]
- 11. Why is excessive use of chloroflouro carbons a cause of concern? [CBSE (F) 2016]
- 12. Name the organism(s) belonging to fourth trophic level in the food chain comprising of snakes, insects, frogs, plants, hawks.
- 13. Mention the role of microorganisms like bacteria and fungi in the ecosystem.
- 14. Suggest suitable mechanism(s) for waste management in fertiliser industries. [NCERT Exemplar]

### Short Answer Questions-II

[3 marks]

- 15. (a) Why are green plants called producers?  
(b) State the scientific term used for progressive accumulation of harmful chemicals at each trophic level of a food chain.

- 16. We do not clean ponds or lakes, but an aquarium needs to be cleaned. Why? [NCERT Exemplar]
- 17. "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. [CBSE (F) 2015]
- 18. Suggest any four activities in daily life which are eco-friendly. [NCERT Exemplar]

### Long Answer Questions

[5 marks]

- 19. Differentiate between food chain and food web.
- 20. What is biological magnification? Will the levels of this magnification be different at different levels of the ecosystem?
- 21. (a) Draw a line diagram to show flow of solar energy in ecosystem.  
(b) Why is the government stressing upon the use of jute/cloth carry bags?  
(c) List any two artificial ecosystems.
- 22. (a) Which gas shields the surface of the earth from the harmful UV-radiations from the sun?  
(b) Mention one example each of biotic and abiotic components of ecosystem.  
(c) Identify which one of the following would have hazardous impact if it persists in the environment for a longtime.

Plastic, vegetable waste, steel utensils