

# Our Environment

## EXERCISE 1.1

### I. Multiple Choice Questions

(1 Mark)

Choose the correct answer from the given options.

- Which one of the following is an artificial ecosystem?  
(a) Pond (b) Crop field (c) Lake (d) Forest
- In a food chain, the third trophic level is always occupied by  
(a) carnivores (b) herbivores (c) decomposers (d) producers
- An ecosystem includes  
(a) all living organisms (b) non-living objects  
(c) both living organisms and non-living objects  
(d) sometimes living organisms and sometimes non-living objects
- In the given food chain, suppose the amount of energy at fourth trophic level is 5 kJ, what will be the energy available at the producer level?  
Grass → Grasshopper → Frog → Snake → Hawk  
(a) 5 kJ (b) 50 kJ (c) 500 kJ (d) 5000 kJ
- In an ecosystem, 10% of energy available for transfer from one trophic level to the next is in the form of:  
(a) heat energy (b) chemical energy  
(c) mechanical energy (d) light energy [Delhi 2020]
- Which of the following are water intensive crops?  
(a) Wheat and rice (b) Wheat and sugarcane  
(c) Sugarcane and rice (d) Wheat and gram [Delhi 2020]
- The most poisonous product formed by incomplete combustion of fossil fuels is  
(a) Carbon dioxide (b) Nitrogen dioxide  
(c) Carbon monoxide (d) Sulphur dioxide [Delhi 2020]
- Food web is constituted by  
(a) relationship between the organisms and the environment.  
(b) relationship between plants and animals.  
(c) various interlinked food chains in an ecosystem.  
(d) relationship between animals and environment. [CBSE 2020]
- How much of the net primary productivity of a terrestrial ecosystem is eaten and digested by herbivores?  
(a) 100% (b) 10% (c) 1% (d) 0.1% [CBSE 2020]
- The decomposers in an ecosystem  
(a) convert inorganic material, to simpler forms  
(b) convert organic material to inorganic forms  
(c) convert inorganic materials into organic compounds  
(d) do not breakdown organic compounds

### II. Assertion-Reason Type Questions

(1 Mark)

For question numbers 2 two statements are given-one labeled as **Assertion** (A) and the other labeled **Reason** (R). Select the correct answer to these questions from the codes (a), (b), (c) and (d) as given below:

- Both 'A' and 'R' are true and 'R' is correct explanation of the Assertion.
  - Both 'A' and 'R' are true but 'R' is not correct explanation of the Assertion.
  - 'A' is true but 'R' is false.
  - 'A' is false but 'R' is true.
- Assertion:** Aquarium needs regular cleaning  
**Reason:** There are no microbes to clean water in aquarium, therefore, it needs to be regularly cleaned.
  - Assertion:** The concentration of harmful chemicals is least in human beings.  
**Reason:** Man is at the apex of the food chain.

### III. Very Short Answer Type Questions

(1 Mark)

1. In the following food chain, 20,000 J of energy was available to the plants. How much energy will be available to man in this chain?

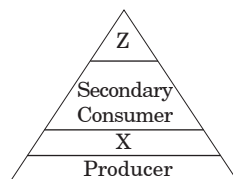
Plants  $\longrightarrow$  Sheep  $\longrightarrow$  Man

2. Which will get more energy, secondary consumers or tertiary consumers? [DOE]  
3. List two natural ecosystems. [Delhi 2016]  
4. List two biotic components of environment. [Delhi 2016] [CBSE 2020]  
5. Why are green plants called producers? [Delhi 2016]  
6. Why do producers always occupy first trophic level of food chain? [Delhi 2016]

OR

The first trophic level in a food chain are always occupied by green plants, why?

7. Which of the following are always at second trophic level of food chains?  
Carnivores, Autotrophs, Herbivores. [Delhi 2015]  
8. What will be the amount of energy available to the organisms of secondary consumer trophic level of food chain, if the energy available to producer level is 10000 Joules. [Delhi 2012]  
9. The following organisms form a food chain. Which of these will have the highest concentration of non-biodegradable chemicals? Name the phenomenon.  
Insects, Hawk, Grass, Snake, Frog. [Delhi 2015] [CBSE 2020]  
10. Select two non-biodegradable substances from the following waste generated in the kitchen:  
Spoil food, Paper bags, Milk, Tea bags, vegetable peels, tin cans, used tea leaves. [Delhi 2012]  
11. What are various steps in the food chain called? [Delhi 2011]  
12. Why are bacteria and fungi called decomposer? [Delhi 2011]  
13. Consider the following food chain which occurs in forest: Grass  $\longrightarrow$  Deer  $\longrightarrow$  Lion  
If 10000 J of solar energy is available to grass, how much energy would be available to deer to transfer to lion. [Delhi 2012]  
14. In a food chain of frog, grass, insect and snake, assign trophic level to frog. [AI 2016]  
15. Give one protective function of forests. [CBSE 2016]  
16. What will be the amount of energy available to the organisms of 2<sup>nd</sup> trophic level of food chain if energy available at the first trophic level is 1000 J. [CBSE 2016]  
17. Write the appropriate names of trophic level 'Z' and 'X' in the figure given below. [CBSE 2015]



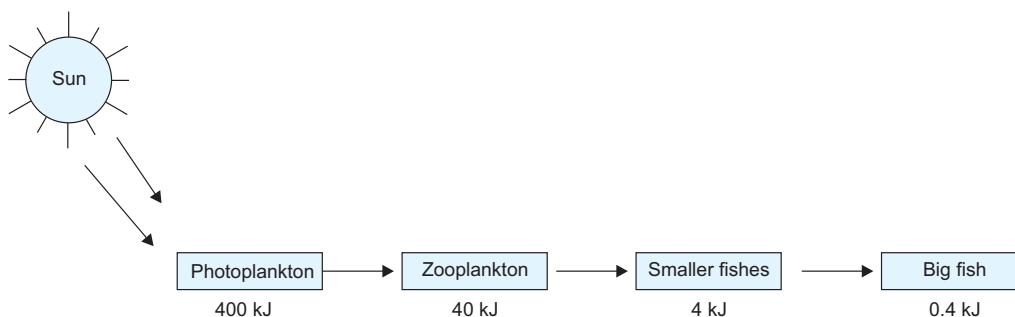
18. State a way to prevent accumulation of harmful chemicals in our bodies. [CBSE 2014]  
19. During heavy rain in a village the rain water carried excessive fertilizer to a pond. How will it affect the fish production in pond in the long run? [CBSE 2014]  
20. "Flow of energy is unidirectional". Name the first two components of the environment involved in flow of energy from the Sun. [CBSE 2014, 2020]  
21. Define ecosystem.

OR

What is an ecosystem?

[CBSE 2014, Delhi 2017]

22. Draw a food chain which operates in forest ecosystem. [CBSE 2012, 13]  
23. What is depicted in the below mentioned scheme? [CBSE 2012]



24. List two man-made ecosystem. [CBSE 2012]
25. "Save the Tiger" campaign is being over emphasised these days by our government. What may be possible reason?
26. Why are plastics non-biodegradable substances? [CBSE 2012]
27. Consider a food chain consisting of wheat, rat, snakes, peacock. What will happen if all snakes are killed? [CBSE 2012]
28. Change one consumer each that belongs to the second and third trophic levels from the following organisms : Eagle, frog, tiger, rabbit, fox [CBSE 2012]
29. In the following food chain, 100 J of energy is available to the lion. How much energy was available to the producer? Plants → Deer → Lion [AI 2017]
30. In the following food chain, 10 J is energy available to the hawks. How much energy would have been present for the rats? Plants → Rats → Snakes → Hawks [CBSE 2019(C)]
31. List two steps that should be taken for the maintenance of healthy environment.

[CBSE 2019(C) for Blind]

32. What is the functional unit of environment? [DOE]
33. Crop fields are called artificial ecosystem, Justify.

#### IV. Short Answer Type Questions-I

(2 Marks)

1. Why are some substances biodegradable and some are non-biodegradable? [Delhi 2011]
2. Define trophic level. Name the first trophic level. [Delhi 2011] [CBSE 2020]
3. Give an example of food chain and state the different trophic levels in it. [Delhi 2011]
4. What is the role of decomposers in the ecosystem? [NCERT] [Delhi 2014, 2011]
5. Study the following food chain: Grass → Sheep or Goat → Man; Algae → Fish → Man  
Who is the ultimate sufferer of using pesticides like DDT on land and in water? Give reason.
6. Why do most food chains have 3-5 steps only?
7. Compare the advantages of cloth bags over polythene bags. [CBSE 2016]
8. Pesticides like DDT which are sprayed to kill pests on crops are found to be present in soil, ground water, water bodies etc. Explain how do they reach these places.
9. Accumulation of harmful chemicals in our body can be avoided. Explain how this can be achieved. [CBSE 2015]
10. What would happen if number of carnivores decreases in the ecosystem?
11. 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?
12. Construct an aquatic food chain showing four trophic levels. [Delhi 2010]
13. Energy flow is unidirectional in food chain? Explain. [Delhi 2013] [CBSE 2020]
14. Name the organisms which belong to first and third trophic level in food chain comprising of the following: Insects, birds, frog and grass.

15. (a) What is an ecosystem? List its two main components. [CBSE 2020]  
(b) We do not clean ponds or lakes, but an aquarium needs to be clean regularly, explain.
16. Arrange the following in food chain: [CBSE 2019]  
(a) Frogs, Insects, Birds, grass. (b) Fish, algae, small animal, big animal.

#### V. Short Answer Type Questions-II

(3 Marks)

1. What will happen if we kill all the organisms in one trophic level? [Delhi 2011, 2020]
2. What is biological magnification? Will the levels of this magnification be different at different levels of the ecosystem? [NCERT]
3. What is meant by food chain? 'The number of trophic levels in food chain is limited.' Give reason to justify the statement. [Delhi 2014]
4. Differentiate between autotrophs, heterotrophs and decomposers and give one example of each.
5. What term do you use for trophic levels comprising of
  - (a) the organisms which make their own food
  - (b) animals feeding on plant matter only
  - (c) organisms breaking down dead plants and animals
6. List three characteristics of energy flow in an ecosystem.
7. (i) Create a terrestrial food chain depicting four trophic levels. [CBSE 2020]  
(ii) Why do we not find food chains of more than four trophic levels in nature? [CBSE Sample Paper 2019-2020]
8. How will you create an artificial aquatic ecosystem, which is self-sustainable? [CBSE Sample Paper 2019-2020]
9. (a) Construct a terrestrial food chain comprising four trophic levels.  
(b) What will happen if we kill all the organisms in one trophic level?  
(c) Calculate the amount of energy available to the organisms at the fourth trophic level if the energy available to the organisms at the second trophic level is 2000 J. [Delhi 2020]
10. Your mother always thought that fruit juices are very healthy for everyone. One day, she read in the newspaper that some brands of fruit juices in the market have been found to contain certain level of pesticides in them. She got worried as pesticides are injurious to health.
  - (a) How would you explain to your mother about fruit juices getting contaminated with pesticides?
  - (b) It is said that the harmful pesticides enter our body as well as the bodies of other organisms, they get accumulated and beyond a limit causes harm and damage to our organs. Name the phenomenon and write about it.



## Answers 1.1

- I.
  1. (a) Crop field is artificial ecosystem.
  2. (a) carnivores are always at the third trophic level
  3. (c) It includes both living organisms as well as non-living objects.
  4. (d) 5000 kJ because 10% of energy is available from one level to another.
  5. (b) It is in form of chemical energy.
  6. (a) Wheat and rice
  7. (c) The most poisonous product is Carbon monoxide.
  8. (c) various interlinked food chains in an ecosystem.
  9. (b) 10%
  10. (b) convert organic material to inorganic forms
- II.
  1. (a) Both 'A' and 'R' are true and 'R' is correct explanation of the assertion.
  2. (d) 'A' is false but 'R' is true.
- III.
  1. Plants have 20,000 J of energy available to them. Sheep will get 10% of 20000 J
 
$$20000 \times \frac{10}{100} = 2000 \text{ J}$$

Humans will get 10% of 2000 J.

$$2000 \times \frac{10}{100} = 200 \text{ J}$$
  2. Secondary consumers will get more energy.
  3. (i) Oceans, (ii) forests are two natural ecosystems.
  4. Plants, animals, micro-organisms (*any two*) are biotic components.
  5. Green plants prepare their own food by photosynthesis with the help of  $\text{CO}_2$ ,  $\text{H}_2\text{O}$ , sunlight and chlorophyll.
  6. They prepare their own food from  $\text{CO}_2$ ,  $\text{H}_2\text{O}$  and sunlight from environment. They are consumed by herbivores, therefore they always occupy first trophic level.
  7. Herbivores will always be at second trophic level.
  8. Energy available to primary consumers level is  $10000 \times \frac{10}{100} = 1000 \text{ J}$ 

Energy available to secondary consumer trophic level =  $1000 \times \frac{10}{100} = 100 \text{ J}$
  9. Hawk is a decomposer and have maximum concentration of non-biodegradable chemicals. The phenomenon is called **Biomagnification**.
  10. Tea bags and tin cans.
  11. Trophic level.
  12. Bacteria and fungi are called decomposer because they breakdown complex organic matter as remains of plants and animals into  $\text{CO}_2$ , methane and other simple molecules which go into atmosphere and as nutrients to soil.
  13. Grass will absorb 1% solar energy *i.e.*  $10000 \times \frac{1}{100} = 100 \text{ J}$ 

Deer will get 10% of 100 J =  $100 \times \frac{10}{100} = 10 \text{ J}$

Out of this 10 J of energy, only 1 J of energy can be transferred to lion.
  14. Grass → Insect → Frog → Snake  
Frog is a secondary consumer and belongs to 3<sup>rd</sup> trophic level.

15. Forests help to reduce air pollution.

16.  $1000 \times \frac{1}{10} = 100 \text{ J.}$

17. 'X' is primary consumer, 'Z' is tertiary consumer in the given figure.

18. Minimum use of fertilizers, insecticides and pesticides, can prevent the accumulation of harmful chemicals in our body.

19. Fish production will decrease due to formation of excess of algae.

20. Producers and primary consumers are first two components in the flow of energy.

21. All living organisms and abiotic components of surroundings forms an ecosystem.

22. Grass → Deer → Tiger.

23. It depicts 10% law in food chain for energy transfer from one trophic level to another.

24. Aquarium, crop land, park. (Any two)

25. It helps to maintain ecological balance in nature and also to preserve gene pool of a particular species.

26. It is because plastics are not decomposed by micro-organisms. (**Note:** Now, plastic eating enzymes has been discovered).

27. The peacock will also die. The population of rats will increase.

28. (i) Second trophic level → Rabbit      (ii) Third trophic level → Frog and fox.

29. Plants → Deer → Lion

It is given that 100 J of energy is available to lion.

Let the amount of energy available to deer be  $x$  Joules.

According to 10% law, 10% energy from deer must have been transferred to lion. So, energy available to deer can be calculated as,  $\frac{10}{100} \times x = 100 \text{ J}$ , Therefore,  $x = 1,000 \text{ J}$

Now, let the amount of energy available to plants be  $y$  Joules.

According to 10% law, 10% energy from plants must have been transferred to deer. So, energy available to plant can be calculated as,

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

Therefore,  $y = 10,000 \text{ J}$

So, we have found that energy available to the producer is 10,000 J.

30. 1000 J.

31. (i) Controlling pollution    (ii) Afforestation    (iii) Proper Waste Disposal (Any two)

32. Ecosystem is the functional unit of environment.

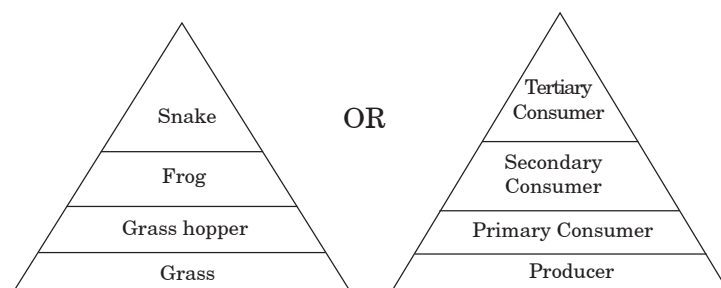
33. Crop field ecosystem is created by man and needs care like watering, supply of manure, protection from diseases. Therefore, it is an artificial ecosystem.

IV. 1. Biodegradable substances are those which are broken by micro-organisms and get decomposed. They do not persist in environment for a very long time e.g., paper.

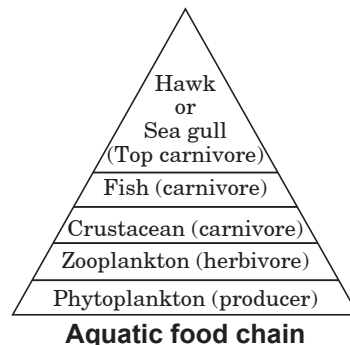
Non-biodegradable substances are those which are not broken by micro-organisms. They persist in environment for long time. e.g. plastic, DDT.

2. Each level in a food chain is called trophic level. First trophic level is producers.

3. An example of food chain is grassland food chain. Its different trophic levels are shown in the given figures.



4. (i) Decomposers decompose the remains of plants and animals.  
(ii) They clean the environment.  
(iii) They bring back the raw materials to environment. (Any two)
5. Man is the ultimate sufferer. Food chain in given cases ends on man *i.e.* last trophic level.
6. Following 10% rule of energy flow, very little energy is left at the trophic levels beyond 3-5 levels that may not be enough to sustain life of a big carnivore, hence most food chains are short and have 3-5 steps only. Longer ones will have very small carnivores at the top.
7. (i) Cloth is biodegradable, does not pollute environment.  
(ii) It can be used again like plastic bag and moreover it is ecofriendly.
8. (i) **Soil.** Pesticides get settled on soil when sprayed over plants.  
(ii) **Groundwater.** Pesticides present in soil reach lower layers of soil during irrigation and get mixed with ground water.  
(iii) **Waterbodies:** When agricultural waste as well as waste water get mixed up with water bodies, pesticides enter waterbodies because these are non-biodegradable.
9. (i) Wash vegetables and fruits with saline water and vinegar.  
(ii) Shock the vegetables in salt water for few minutes before cooking.  
(iii) Boil the vegetables.  
(iv) Organic manure and organic ecofriendly pesticides should be used.
10. If number of carnivores decreases in the ecosystem, then it will lead to increase in number of herbivores. As a result number of plants will decrease and consequently amount of  $O_2$  will also decrease in the ecosystem.
11. The impact of removing all the organisms in a trophic level will be different for different trophic levels. It is not possible to remove organisms of any trophic level without causing damage to ecosystem because organisms of each level are interdependent.
- 12.



13. The energy of sun is taken by plants and cannot be given back. Herbivore eat plants and cannot give back energy to plants. Carnivores eat herbivores and cannot give back energy to herbivores. It means flow of energy is unidirectional from lower trophic level to higher trophic level.
  14. First trophic level – Grass  
Third trophic level – Frog
  15. (a) Ecosystem is composed of different organisms interdependent upon each other. Biotic and abiotic components are its two main components.  
(b) Pond or lake is a natural ecosystem, several organisms present in it maintain a balance in the ecosystem. Aquarium is an artificial ecosystem in which bacteria convert fish food into ammonia which is harmful for fish. Water needs to be changed regularly. Chlorine water should be dechlorinated otherwise fish will not survive. Air pump is needed to provide oxygen. Artificial ecosystem need utmost care to remain stable.
  16. (a) Grass → Insects → Frog → Birds  
(b) Algae → Small animal → Fish → Big animal
- V. 1.** If we kill the organisms in one trophic level.
- (i) The population of organisms in previous trophic level will increase.
  - (ii) The population of organisms in next trophic level may decrease.
  - (iii) It will cause an ecological imbalance in the food chain.

2. The process in which harmful chemicals like pesticides enter the food chain and get accumulated in each trophic level is called biomagnification. The level of biomagnification will be different from different trophic level. Primary consumers will have higher concentration of pesticides than producers and secondary consumers will get pesticides by eating primary consumers and will have even higher concentration.

3. Food chain is a sequence in which nutrients, food and energy is transferred in systematic way. Lower trophic level have maximum population because energy is available in more extent.

Primary consumers get 10% of energy of producers.

Secondary consumers get 10% of energy of primary consumers.

Tertiary consumers get 10% of energy of secondary consumers *i.e.* very less energy is available, that is why the trophic levels are limited. Tiger population is decreasing day by day as food is not easily available for them and forests are decreasing due to cutting of trees.

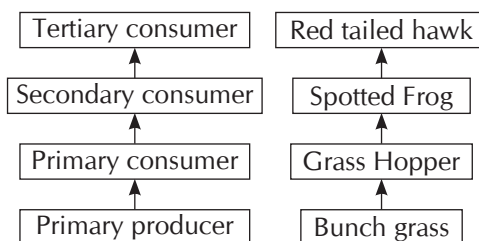
4. (i) **Autotrophs.** Those organisms which prepare their own food with the help of  $\text{CO}_2$ ,  $\text{H}_2\text{O}$  and sunlight in presence of chlorophyll *e.g.* green plants.  
 (ii) **Heterotrophs.** Those organisms which do not prepare their own food but dependent on the other food. *e.g.* animals and human beings.  
 (iii) **Decomposers.** Those organisms which decompose the complex molecules present in the dead remains of plants and animals *e.g.* bacteria, fungi, earthworm.

5. (a) Producers (b) Herbivores (c) Decomposers

6. (i) The sun is the main source of energy on earth. About 1% of incident solar energy is utilized by plants during photosynthesis.  
 (ii) Producers [plants] convert solar energy to chemical energy of food, and then it is passed on to the consumers and to decomposers back to soil. This is in accordance with law of conservation of energy.  
 (iii) The energy flow is unidirectional, that is, it flows from producers through herbivores to carnivores; it cannot be transferred in the reverse direction.  
 (iv) The amount of energy flow decreases with successive trophic levels.

[Any three]

7. (i) A terrestrial food chain depicting four trophic levels is shown in diagram.  $\frac{1}{2}$   
 (ii) According to the 10% law, the amount of energy available will not be sufficient for the survival of the organisms in the 5th trophic level.  $\frac{1}{2} + \frac{1}{2} + \frac{1}{2}$   
 (A flow chart or a diagrammatic representation showing all the four trophic levels would also be accepted).



According to the 10% law, the amount of energy available will not be sufficient for the survival of the organism in the 5th trophic level.

8. • Take a large jar filled with water, oxygen, food and aquatic plants and animals.  
 • Oxygen/oxygen pump.  
 • Fish food.  
 • Aquatic plants/Producers provide  $\text{O}_2$  during photosynthesis.  
 • Aquatic animals/Consumers release  $\text{CO}_2$  for the process of photosynthesis.  
 • Decomposers are also important for natural cleaning of the aquarium.

9. (a) Level 1 Plants and algae

Level 2 Herbivores like goat, cow

Level 3 Carnivores like fox, wild cat, mongoose

Level 4 large carnivores, lion, tiger

- (b) If we kill all organisms in one trophic level, then transfer of energy as well as matter to next higher level will stop, it will lead to overpopulation at one particular level, disturb the food chain and cause collapse of ecosystem.

- (c) Energy available at second trophic level of 2000 J

Energy available at third trophic level is  $2000 \times \frac{1}{10} = 200 \text{ J}$

Energy available at fourth trophic level is  $200 \times \frac{1}{10} = 20 \text{ J}$

10. (a) Farmers spread pesticides on fruits and it get mixed up with fruits and enter fruit juices.  
(b) The process is called bio-magnification. The concentration of toxic substances like pesticides, insecticides increase with each trophic level in food chain.

## EXERSISE 1.2

### I. Multiple Choice Questions

(1 Mark)

Choose the correct answer from the given options.

- Depletion of ozone is mainly due to  
(a) chlorofluorocarbons (b) carbon monoxide  
(c) methane (d) pesticides
- Excessive exposure of humans to UV-rays results in  
(i) damage to immune system (ii) damage to lungs  
(iii) skin cancer (iv) peptic ulcers  
(a) (i) and (ii) (b) (ii) and (iv) (c) (i) and (iii) (d) (iii) and (iv)
- In the following groups of materials, which group(s) contains only non-biodegradable items?  
(i) Wood, paper, leather (ii) Polythene, detergent, PVC  
(iii) Plastic, detergent, grass (iv) Plastic, bakelite, DDT  
(a) (iii) (b) (iv) (c) (i) and (iii) (d) (ii) and (iv)
- Which one of the following greenhouse gases is a contributor due to incomplete combustion of coal and petroleum?  
(a) Oxides of nitrogen (b) Methane  
(c) Carbon monoxide (d) Carbon dioxide [CBSE Sample Paper 2019-2020]
- Choose the incorrect statement from the following:  
(a) Ozone is a molecule formed by three atoms of oxygen.  
(b) Ozone shields the surface of the Earth from ultraviolet radiations.  
(c) Ozone is deadly poisonous.  
(d) Ozone gets decomposed by UV radiations. [CBSE 2020]

### II. Assertion-Reason Type Questions

(1 Mark)

For question numbers 2 two statements are given-one labeled as **Assertion** (A) and the other labeled **Reason** (R). Select the correct answer to these questions from the codes (a), (b), (c) and (d) as given below:

- (a) Both 'A' and 'R' are true and 'R' is correct explanation of the Assertion.  
(b) Both 'A' and 'R' are true but 'R' is not correct explanation of the Assertion.  
(c) 'A' is true but 'R' is false.  
(d) 'A' is false but 'R' is true.
- Assertion:** Ozone is formed in upper atmosphere by  $O_2$  in presence of UV radiations.  
**Reason:** Ozone depletion will lead to UV rays reaching earth which may cause skin cancer.
  - Assertion:** Polythene bags and plastic containers are non-biodegradable substances.  
**Reason:** They can be broken down by microorganisms in natural simple harmless substances.

### III. Very Short Answer Type Questions

(1 Mark)

- Which of the following are not biodegradable: Wool, glass, silver foil, leather? [DOE]
- What is full form of CFC and UNEP? [DOE] [Delhi 2015]
- Name the radiations that are absorbed by ozone layer? [DOE]
- Why is excessive use of CFC a cause of concern? [Delhi 2016]
- Name the gases which have replaced CFCs. [CBSE 2014]
- Ozone is deadly poisonous, still it performs an essential function. How? [CBSE 2012]
- What happens during first step of ozone formation in the the atmosphere?
- Why should bio-degradable and non-biodegradable wastes discarded into separate dust bins? [Delhi 2015]
- Name any two items which can be easily recycled but are generally thrown in the dust-bin by us. [Delhi 2013]

#### IV. Short Answer Type Questions-I

(2 Marks)

1. What is ozone and how does it affect any ecosystem? [NCERT]
2. If all the waste we generate is biodegradable, will this have no impact on the environment?
3. Mention three methods to reduce amount of wastes produced.
4. List two causes of depletion of ozone layer. Mention any two harmful effects of depletion of this layer. [CBSE 2019 AI]
5. Which compounds are responsible for the depletion of ozone layer? [CBSE 2012, 13, AI]

#### V. Short Answer Type Questions-II

(3 Marks)

1. When the government banned the use of polybags in Delhi, the vegetable grocers found it difficult as it affected their sales. The market committee held a meeting and decided to spread awareness about harmful effect of polybags. [Delhi 2016]
  - (i) How will you convince people that plastics are harmful to the environment?
  - (ii) What alternatives of polythene bags do we have, which are environment friendly?
  - (iii) Not many people in Delhi have stopped using polythene bags even though they are officially banned. How can schools enaculate environmental values in students?
2. (a) Why is it necessary to conserve our environment?  
(b) State the importance of green and blue dustbins in the safe disposal of the household waste.
3. (i) What is the height of ozone from the equator?  
(ii) Name the rays against which ozone layer provides protection.  
(iii) Name one effect of depletion of ozone layer. [CBSE 2016]
4. You have been selected to talk on “ozone layer and its protection” in the school assembly on ‘Environment Day’.
  - (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.
5. (a) Water is an elixir of life, a very important natural resource. Your Science teacher wants you to prepare a plan for a formative assessment activity, “How to save water, the vital natural resource”. Write any two ways that you will suggest to bring awareness in your neighbourhood, on ‘how to save water’.  
(b) Name and explain any one way by which underground water table does not go down further. [AI 2017]
6. How is ozone both beneficial and damaging? How can we prevent the damaging effect of ozone? List one way.
7. (a) Complete the following table:

<b>Formula</b>	(i) _____	(ii) _____
Benefits to biotic component	(iii) _____	(iv) _____ _____ _____

- (b) How is ozone formed at the higher levels of atmosphere? [CBSE 2020]
8. (a) Improvement in our lifestyle has resulted in greater amount of waste generation. Suggest one change we can incorporate in our lifestyle in order to reduce non-biodegradable waste.  
(b) The following organisms form a food chain:  
Insect, Hawk, Grass, Snake, Frog  
Which of these will have highest concentration of non-biodegradable chemicals? Name the phenomenon. [CBSE Sample Paper 2017-18] [CBSE 2020]

#### VI. Long Answer Type Questions

(5 Marks)

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 of non-biodegradable waste for saving the environment. [AI 2015]
2. What is ozone? How and where is it formed in the atmosphere? Explain how it affects an ecosystem. [Foreign 2015]

OR

What is ozone and how does it affect any ecosystem?

3. Mention the negative effect of our lifestyle on the environment. [Delhi 2013, 2016]
4. (a) What do you understand by ‘watershed management’? List any two advantages of watershed management.  
(b) Human beings occupy the top level in any food chain. What are the consequences of this on our body? [CBSE Sample paper 2017-2018]



## Answers 1.2

- I. 1. (a) chlorofluorocarbons deplete ozone layer.
2. (c) (i) and (iii), (iii) (d) (ii) and (iv), (iv) (c) Carbon monoxide
3. (d) Ozone gets decomposed by UV radiations.
- II. 1. (b) Both 'A' and 'R' are true but 'R' is not correct explanation of the assertion.
2. (c) 'A' is true but 'R' is false.
- III. 1. Glass, silver foil.
2. CFC stands for Chlorofluorocarbon  
UNEP stands for United Nations Environment Programme.
3. UV radiations (Ultra-Violet radiations) are absorbed by ozone layer.
4. CFC will deplete ozone layer which prevents UV radiation to reach earth. It causes skin cancer.
5. (i) HFCs (Hydrofluorocarbons), (ii) Perfluorocarbons (PFCs) have replaced CFCs.
6. It protects earth from harmful UV radiations.
7.  $O_2 \xrightarrow{UV} O + O$
8. It saves time and energy by separating them and waste disposal can be done in right way in minimum time.
9. (i) Bits of paper (ii) Plastic bottles of water or cold drinks.
- IV. 1. Ozone is a triatomic ( $O_3$ ) gas formed in upper atmosphere by action of UV light on oxygen. It protects earth from harmful UV radiations.
2. If all waste we generate is biodegradable, the adverse effect on environment will be minimum. They will produce  $CO_2$ , methane which is released in atmosphere.  
Nutrients will be mixed in soil to increase the fertility of soil.
3. (i) Recycling of non-biodegradable waste.  
(ii) Reuse of waste such as newspapers can be used for making carry bags and envelopes.  
(iii) Biodegradable domestic waste should be disposed in pits to form manure.  
(iv) Biogas plants should be used for disposal of waste in rural areas.
4. Two causes of depletion of ozone layer are: (i) CFCs (ii) Aerosols  
Two harmful effects of depletion of this layer are:  
(i) UV radiations can reach the earth and causes skin cancer, harmful to eyes and immune system will be disturbed.  
(ii) It may lead to variations in rainfall, ecological disturbance.
5. (i) CFC, (ii)  $NO$ , (iii) Free radicals of chlorine (iv) Aerosols
- V. 1. (a) They need to be told that cows and other animals eat polythene which is fatal for them. Coloured polythene is also very harmful for vegetables and fruits.  
(ii) Paper bags, jute bags, bags of biodegradable materials are ecofriendly and carrying your own shopping bag is also more convenient.  
(iii) Schools must teach students to protect environment. They should make paper bags and distribute to small shopkeepers regularly so that gradually their habits will change.
2. (a) It is necessary to conserve our environment because  
(i) It helps in protecting the ozone layer.  
(ii) It helps in maintaining animal and human food chains.  
(iii) It provides us with many useful products such as medicines and wood.  
(b) Disposal of household waste is carried out in green and blue bins, respectively. It will be very useful in the separate disposal of biodegradable and non-biodegradable wastes. This will also ensure the application of 3 R's— Reduce, Reuse and Recycle.
3. (i) 10 to 16 km (ii) UV rays (iii) Global warming.
4. (a) Ozone layer is a rich zone of ozone found in upper atmosphere. It helps in shielding the Earth from the harmful UV radiations coming from the Sun. If ozone layer gets depleted, UV radiations can directly reach the Earth's surface and drastically affect the life on Earth. For instance, UV radiations coming from the Sun causes skin cancer. So, it is very important to protect the ozone layer so as to save our environment and the planet Earth.

- (b) Some of the ways to help protect and stop the depletion of the ozone layer include: Not buying products in aerosol cans, maintaining air-conditioning filters and units.

In order to halt the depletion of the ozone layer, countries around the world have banned the use of chlorofluorocarbons and other ozone-depleting substances. These compounds produce chlorine and bromine atoms high in the atmosphere, and these atoms react with ozone, destroying it.

By reducing the use of fluorescent lights.

By minimising the use of vehicles to limit the emission of harmful gases that cause damage to the ozone layer, we can contribute to its protection.

5. (a) Water is one of the most precious natural resources that has vital importance in our lives. It is an essential component of the human body and is used almost everywhere in our day-to-day activities, such as cooking, washing, in agriculture and industries. It is an indispensable part of our life, without which the life on earth is not possible. However, the amount of fresh water available for sustaining life is very less. So, it is very important to conserve water. For creating awareness among people, we can adopt the following two ways.

- (i) Door to door campaigning. (ii) *Nukkad Nataks*

- (b) Underground water table can be recharged through rainwater harvesting. Rainwater harvesting is a process by which rain water is collected and stored for the purpose of recharging the ground water or for future use like for irrigation and agriculture, for livestock, etc. In India, rainwater harvesting is an old tradition, which is followed till now in many parts of India. For example, *bawris* are traditional architectural rainwater harvesters that were built for collecting water, in the state of Rajasthan.

There are two ways of rainwater harvesting:

- (i) **Surface runoff harvesting:** In urban areas, rain water that flows away from the surface can be collected and used for various purposes.  
(ii) **Rooftop rainwater harvesting:** The rainwater on the roofs of the buildings is collected through canals that drains the water into ground water reservoirs. This stored water can later be utilised.

6. Damaging as it is a deadly poison.

Beneficial as it shields the surface of the earth from UV radiations of the Sun.

By not using synthetic chemicals like CFCs, that depletes O<sub>3</sub> layer.

7. (a)

	Oxygen	Ozone
<b>Formula</b>	(i) O <sub>2</sub>	(ii) O <sub>3</sub>
Benefits to biotic component	(iii) essential for breathing and to survive	(iv) • prevents UV rays to reach earth • disinfectant • strong oxidant

- (b) It is formed by action of UV light on oxygen.  $3\text{O}_2(g) \xrightleftharpoons{\text{UV}} 2\text{O}_3(g)$

8. (a) (i) More use of disposable items like paper plates, plastic and polythene which are recyclable.  
(ii) Change in packaging Suggestion. Reuse of plastic containers  
(b) Hawk will have highest concentration of non-biodegradable chemicals. This process is called biomagnification.

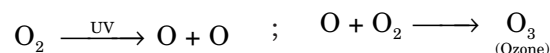
## VI. 1.

Can be broken down into simpler substances by nature / decomposers/ bacteria/ saprophytes.	Can't be broken down into simpler substances by nature / decomposers.
Eg. – Human Excreta/ Vegetable peels, etc. (any one)	Eg. – Plastic/ glass (any one)

Two habits to dispose of non-biodegradable wastes are:

- (i) Use of separate dustbins for biodegradable and non-biodegradable wastes,
  - (ii) Reuse of things such as polybags, etc.,
  - (iii) Recycling of wastes
  - (iv) Use of cotton /jute bags for carrying vegetables etc. (*Any two*)
2. Ozone is a molecule containing three atoms of oxygen ( $O_3$ ). It is a highly poisonous gas present in the upper layers of the atmosphere.

Formation of ozone: The UV radiations from Sun split some molecules of oxygen ( $O_2$ ) apart into free oxygen atoms ( $O + O$ ). These atoms then combine with oxygen molecules to form ozone.

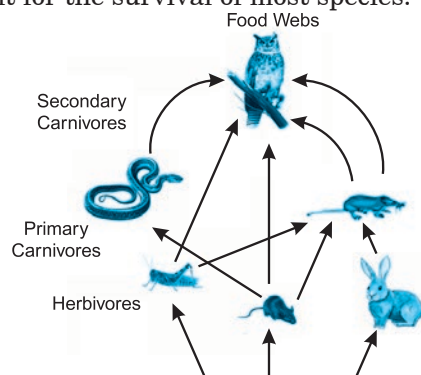


Ozone layer shields the surface of the earth against damaging UV radiations of the Sun.

3. (i) Global warming occurs due to increase in number of vehicles and over use of fossil fuels.  
(ii) Due to excessive use of deodorants, perfumes, CFCs, etc. ozone layer is getting depleted.  
(iii) Air pollution occurs due to industrialisation.  
(iv) Wastes causes pollution due to release of sewage in water bodies.  
(v) Pollution of soil occurs due to overuse of chemicals in agriculture.
4. (a) Soil and water conservation in a scientific way is called 'watershed management'.  
**Advantages:** (i) Increase in production and income of watershed communities,  
(ii) Mitigate draughts and floods, (iii) Increase the life of downstream dam reservoir.  
(b) Maximum level of biomagnification occurs in human beings because of progressive accumulation.  
We get very small amount of energy as only 10% of previous energy gets transferred to each trophic level.

## CASE STUDY QUESTIONS

1. Food chains are very important for the survival of most species.



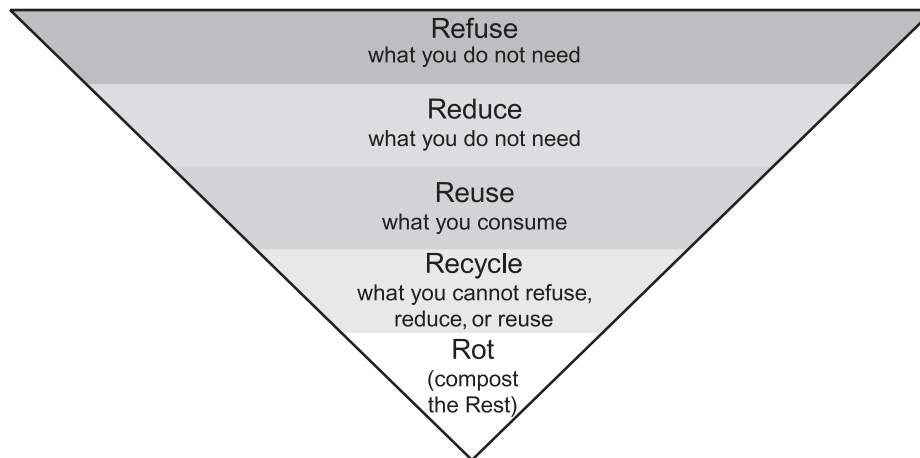
- (i) If 10,000 J solar energy falls on green plants in a terrestrial ecosystem, what percentage of solar energy will be converted into food energy?  
(a) 10,000 J      (b) 100 J      (c) 1000 J  
(d) It will depend on the type of the terrestrial plant.
- (ii) If Ravi is consuming curd/yogurt for lunch, which trophic level in a food chain he should be considered as occupying?  
(a) First trophic level      (b) Second trophic level  
(c) Third trophic level      (d) Fourth trophic level
- (iii) The decomposers are not included in the food chain. The correct reason for the same is because

decomposers:

- (a) Act at every trophic level of the food chain
  - (b) Do not breakdown organic compounds
  - (c) Convert organic material to inorganic forms
  - (d) Release enzymes outside their body to convert organic material to inorganic forms
- (iv) Matter and energy are two fundamental inputs of an ecosystem. Movement of
- (a) Energy is bidirectional and matter is repeatedly circulating.
  - (b) Energy is repeatedly circulation and matter is unidirectional.
  - (c) Energy is unidirectional and matter is repeatedly circulating.
  - (d) Energy is multidirectional and matter is bidirectional.
- (v) Which of the following limits the number of trophic levels in a food chain?
- (a) Decrease in energy at higher trophic levels
  - (b) Less availability of food
  - (c) Polluted air
  - (d) Water

**Ans.** (i) (b)      (ii) (c)      (iii) (a)      (iv) (c)      (v) (a)

2. Observe the following diagram and answer the questions any four from (i) and (v)



- (i) Choose the waste management strategy that is matched with correct example.
- (a) Refuse      Choose products that use less packaging
  - (b) Reduce      Give unwanted toys and books to hospitals or schools
  - (c) Reuse      Not using single use plastic
  - (d) Repurpose      Making flower pot from used plastic bottle
- (ii) Recycling of paper is a good practice but recycled paper should not be used as food packaging because
- (a) recycled papers may release color /dyes on food items
  - (b) recycled papers are not absorbent
  - (c) recycled papers can cause infection due to release of methane
  - (d) recycled papers are costly

- (iii) According to the 'Solid Waste Management Rule 2016', the waste should be segregated into three categories. Observe the table below and select the row that has correct information

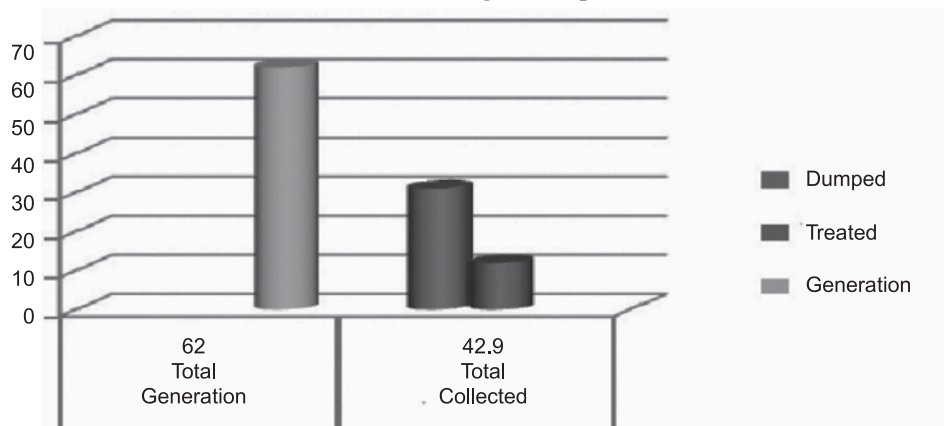
	Waste Water	Dry Water	Hazardous Water
(a)	Cooked food, vegetable peels	Used bulbs, fluorescent lamps	Plastic carry bags, bottles, newspaper, cardboard
(b)	Coffee and tea powder, garden waste	Plastic carry bags, bottles, newspaper, cardboard	Expired medicines, razors, paint cans
(c)	Leftover food, vegetable peels	Coffee and tea powder, garden waste	Insect repellents, cleaning solutions
(d)	Uncooked food, tea leaves	Old crockery, frying pans	Coffee and tea powder, garden waste

- (iv) Effective segregation of wastes at the point of generation is very important. Select the appropriate statements giving the importance of waste segregation.

- I. less waste goes to the landfills
- II. better for public health and the environment
- III. help in reducing the waste
- IV. resulting in deterioration of a waste picker's health

- (a) both I and II      (b) both I and III      (c) both II and III      (d) both I and IV

- (v) The given graph shows the amount of waste generated, dumped and treated in percentage. Identify the reason of low success rate of waste management process.



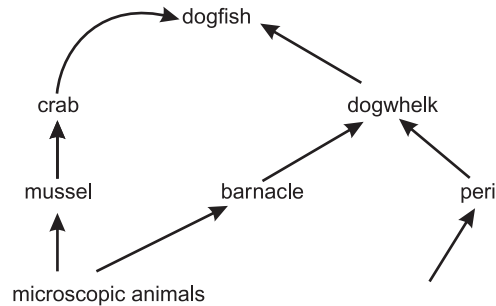
- (a) only 15% of urban India's waste is processed  
 (b) less than 60% of waste is collected from households  
 (c) more than 60% of waste is collected from households  
 (d) both (a) and (b)

**Ans.** (i) (d)      (ii) (c)      (iii) (b)      (iv) (a)      (v) (a)

3. Biosphere is a global ecosystem composed of living organisms and abiotic factors from which they derive energy and nutrients. And ecosystem is defined as structural and functional unit of the biosphere comprising of living and non-living environment that interact by means of food chains and chemical cycles resulting in energy flow, biotic diversity and material cycling to form a stable, self-supporting system

BIOTIC vs. ABIOTIC FACTORS	
<b>Living Examples</b> <ul style="list-style-type: none"> <li>• Plants</li> <li>• Animals</li> <li>• Fungi</li> <li>• Bacteria</li> </ul>	<b>Non-Living Examples</b> <ul style="list-style-type: none"> <li>• Water</li> <li>• Sunlight</li> <li>• Soil</li> <li>• Air</li> <li>• Temperature</li> </ul>

- (i) Which trophic level is incorrectly defined?
- Carnivores – secondary or tertiary consumers
  - Decomposers – microbial heterotrophs
  - Herbivores – primary consumers
  - Omnivores – molds, yeast and mushrooms
- (ii) The diagram below shows a food web from the sea shore



The mussel can be described as

- Producer
  - Primary consumer
  - Secondary consumer
  - Decomposer
- (iii) The given figure best represents:



- Grassland food chain
  - Parasitic food chain
  - Forest food chain
  - Aquatic food chain
- (iv) Consider the following statements concerning food chains:
- Removal of 80% tigers from an area resulted in greatly increased growth of vegetation
  - Removal of most of the carnivores resulted in an increased population of herbivores.
  - The length of the food chains is generally limited to 3 – 4 trophic levels due to energy loss
  - The length of the food chains may vary from 2 to 8 trophic levels

Which two of the above statements are correct?

- (i), (iv)
  - (i), (ii)
  - (ii), (iii)
  - (ii), (iv)
- (v) Which of the following group of organisms are not included in ecological food chain?

- Carnivores
- Saprophytes
- Herbivores
- Predators

**Ans.** (i) (d)      (ii) (c)      (iii) (a)      (iv) (c)      (v) (b)



## ASSIGNMENT

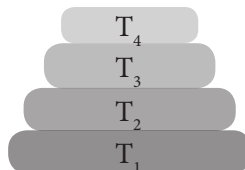
Total Marks : 20

### I. Multiple Choice Questions

(8 × 1 = 8)

Choose the correct answer from the given options.

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



- (a) T<sub>4</sub>                      (b) T<sub>2</sub>                      (c) T<sub>1</sub>                      (d) T<sub>3</sub>
2. What will happen if deer is missing in the food chain given below?  
Grass → Deer → Tiger
- (a) The population of tiger increases  
(b) The population of grass decreases  
(c) Tiger will start eating grass  
(d) The population of tiger decreases and the population of grass increases

### II. Assertion-Reason Type Questions

(2 × 1 = 2)

**Note:** Use instructions as given in topical exercises of the chapter.

1. **Assertion:** CFCs (Chloro fluorocarbons) deplete ozone layer.  
**Reason:** NO also depletes ozone layer which is generated by jet aeroplanes in stratosphere.
2. **Assertion:** Aquarium needs regular cleaning  
**Reason:** There are no microbes to clean water in aquarium, therefore, it needs to be regularly cleaned.

### III. Very Short Answer Type Questions

(1 Mark)

1. If producer have 1000 J of energy, how much energy will reach to tertiary consumer?  
2. Why should biodegradable and non-biodegradable waste be discarded in two separate dust-bins?

### IV. Short Answer Type Questions-I

(2 Marks)

1. Draw an energy pyramid showing different trophic levels.  
2. Distinguish between producers and decomposers.

### V. Short Answer Type Question-II

(3 Marks)

1. How can we help in reducing the problem of waste disposal? Suggest any three methods. [Delhi 2019]

### VI. Long Answer Type Question

(5 Marks)

1. (i) What is food web? Illustrate with the help of example.  
(ii) (a) What is an ecosystem? List its two main components.  
(b) We do not clean ponds or lakes, but an aquarium needs to be cleaned regularly, explain.