Our Environment

OBJECTIVE TYPE QUESTIONS

Multiple Choice Questions (MCQs)

1. Which of the following is an abiotic component of an ecosystem?
(a) Bacteria (b) Plants
(c) Fungi (d) Humus

2. Which of the following belongs to the category of primary consumers?
(a) Eagle and snake
(b) Grasshopper and cattle
(c) Snake and frog
(d) Water beetle and fish

3. Food web helps in
(a) providing alternative pathways of food availability
(b) checking the overpopulation
(c) ecosystem stability
(d) all of these.

4. As it travels along the food chains, the concentration of DDT
(a) increases
(b) remains constant
(c) decreases
(d) fluctuates randomly.

5. Shorter food chains provide
(a) more energy (b) less energy
(c) same energy (d) any of these.

6. In a grazing food chain, primary consumers (herbivores) represent
(a) T_1 level (b) T_2 level
(c) T_3 level (d) T_4 level.

7. Which of the following does not help in protecting our environment?
(a) Crop rotation
(b) Treatment of sewage
(c) Deforestation
(d) Judicious use of fertilisers

8. Now-a-days, which type of cups are being generally used in trains for serving tea/coffee/ soup etc. on daily basis?
(a) Washable glass cups
(b) Washable plastic cups
(c) Disposable paper cups
(d) Disposable cups made of plastic

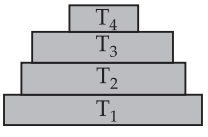
9. Green house gas produced by incomplete decomposition by anaerobic methanogens is
(a) CH_4 (b) CFCs
(c) CO_2 (d) N_2O

10. Of the total amount of energy that passes from one trophic level to another in a food chain, about 10% is
(a) transpired
(b) burnt in respiration
(c) stored in body tissues
(d) lost as heat.

11. If there was no CO_2 in the atmosphere, the earth's temperature would be
(a) less than the present temperature
(b) same as the present temperature
(c) higher than the present temperature
(d) dependent on O_2 content of air.

12. 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

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



(a) T_4 (b) T_2
(c) T_1 (d) T_3

14. Which group of organisms together do not constitute a food chain?

I . Grass, lion, rabbit, wolf

II. Plankton, man, hawk

III. Wolf, grass, snake, tiger

IV. Frog, snake, eagle, grass, grasshopper

(a) I and III (b) III and IV

(c) II and III (d) I and IV

15. Fish that feeds on zooplanktons is a

(a) primary consumer

(b) secondary consumer

(c) tertiary consumer

(d) decomposer.

16. Which of the following pyramids is always upright?

(a) Pyramid of energy

(b) Pyramid of biomas

(c) Pyramid of numbers

(d) None of these

17. Which of the following statements is incorrect?

(a) A food chain is always straight.

(b) Producers belong to second trophic levels.

(c) Top carnivore are fourth order consumers.

(d) Consumers obtain organic nutrients from outside as food.

18. Select the mismatched pair.

(a) Crop field – Natural ecosystem

(b) Garden – Man made ecosystem

(c) Temperature – Abiotic factor

(d) Grass – Transducer

19. DDT was accidently added to the water of a lake. All the organisms in it would be affected by DDT. Which of the following organisms would be affected the most?

(a) Man

(b) Birds living in the lake

(c) Fish living in the lake

(d) Aquatic plants in the lake

20. The thinning of ozone layer was first observed in

(a) 1980s (b) 1950s

(c) 1940s (d) 1990s.

21. Ozone layer is essential because it absorbs most of the

(a) infrared radiations

(b) solar radiations

(c) ultraviolet radiations

(d) both (a) and (b).

22. Burning of waste substances usually in anaerobic conditions at high temperature of about 670°C is called

(a) land filling (b) composting

(c) incineration (d) none of these.

23. Select the odd one out.

(a) Tomato leaves (b) Wood

(c) Synthetic polymers (d) Lime juice

24. Complete the given analogy.

Non-biodegradable : _____ ::
Biodegradable : Livestock wastes

(a) Cotton (b) Grass

(c) Glass (d) Orange peel

25. Which of the following groups contain non-biodegradable substances only?

(a) Flowers, crops, plastic

(b) Plastic, polythene bags, aluminium cans

(c) Grass, wood, glass

(d) Fruit and vegetable peels, grass, wood

26. Select the incorrect statement.

(a) Food we eat is digested by various enzymes in our body.

(b) Non-biodegradable substances are not broken down by biological processes.

(c) All enzymes have same action on each substance.

(d) Plastics cannot be broken down by the action of bacteria and other saprophytes.

27. Minamata disease is due to

(a) MIC gas (b) methyl mercury

(c) lead nitrate (d) cobalt chloride.

28. According to Charles Elton, which is not correct?

(a) Carnivores at the top of the pyramid.

(b) Producers at the top of the pyramid.

(c) Energy trapping is high at the top of the pyramid.

(d) Both (b) and (c)

29 Which of the following statements regarding solid wastes is correct?

(a) Change in the packaging technology has resulted in generation of lot of solid wastes.

(b) Dumping of solid wastes could reduce the fertility of the soil leading to reduction in crop yield.

(c) Accumulation of solid waste could cause increased incidents of disease in a locality.

(d) All of these.

30 Incineration and pyrolysis are two methods of waste disposal done at high temperature. The two differs from each other as in later

(a) aerobic burning occurs

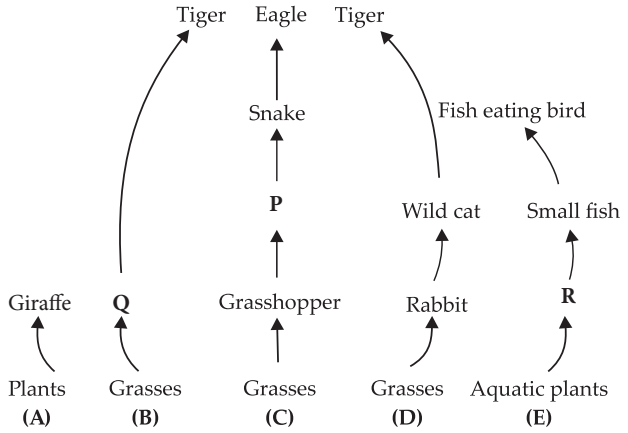
(b) chemical energy and chemical constituents are recovered

(c) ashes are the end products

(d) medical wastes are burnt with clinkers as the end product.

Case Based MCQs

Case I : Read the passage given below and answer the following questions from 31 to 35.
Grazing food chains are directly dependent upon solar radiations as the primary source of energy. Green plants (or producers) form the first trophic level of the food chain. They synthesise their food by the process of photosynthesis. Herbivores or primary consumers feed upon the producers and form the second trophic level. Herbivores are eaten by carnivores of different categories. These are longer food chains.
Given below are 5 grazing food chains operating in the nature.



31. Select the option that correctly identifies P, Q and R.

	P	Q	R
(a)	Frog	Deer	Aquatic insect
(b)	Frog	Elephant	Phytoplankton
(c)	Tadpole	Deer	Zooplankton
(d)	Dog	Elephant	Algae

32. According to the given food chains which of the following animals is both secondary and tertiary consumer?

(a) Rabbit (b) Tiger

(c) Eagle (d) Small fish

33. Top consumer in which of the following food chains will have the maximum energy?

(a) Food chain A

(b) Food chain B

(c) Food chain C

(d) Food chain D

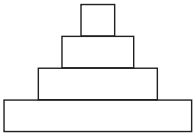
34. If energy present in producers of food chain D is 20,000 KJ. Then amount of energy present in its secondary consumer will be

(a) 2000 KJ (b) 20 KJ

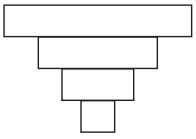
(c) 2 KJ (d) 200 KJ.

35. What will be the shape of pyramid of biomass of food chain E?

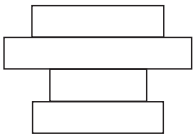
(a)



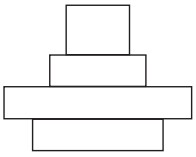
(b)



(c)

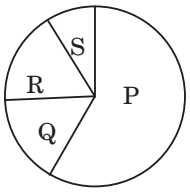


(d)



Case II : Read the passage given below and answer the following questions from 36 to 40.
Various components of an ecosystem maintain a balance in nature. Disturbance in any component of the environment cause an imbalance. One of the main environmental problem caused by human activities is global warming. Global warming is a phenomenon caused by the increasing concentration of greenhouse gases in the atmosphere resulting due to enhanced greenhouse effect.

36. Refer to the given pie chart showing the contribution of different gases to global warming.



Identify gases P, Q, R and S and select the incorrect statement regarding them.

(a) P could be a gas that increases in atmosphere due to excessive use of fossil fuel.
(b) Q could be a gas produced by complete combustion of biomass.
(c) R could be synthetic gaseous compounds used as refrigerants in air conditioners and refrigerators.
(d) S could be a gas produced by combustion of nitrogen rich fuel.

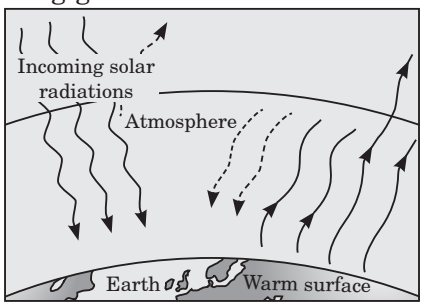
37. What could not be a source of gas Q given in the above pie chart?

(a) Flooded paddy field (b) Cattle
(c) Jet fuel (d) Marshes

38. If there is no CO_2 in the atmosphere, then what will be the most likely consequence of this on the temperature of earth?

(a) The temperature remain unchanged as it depends upon the oxygen content of the atmosphere.
(b) The temperature would increase as less greenhouse gases will be absorbed by CO_2.
(c) The temperature would decrease as CO_2 is the principal greenhouse gas.
(d) None of these

39. Study carefully the following figure representing greenhouse effect.



Select the correct statement regarding this.

(a) Much of the long wavelength infrared radiations re-radiated by the earth's surface are absorbed by the atmospheric greenhouse gases.
(b) CO_2, CH_4, CFCs and N_2O are the gases which are responsible for greenhouse effect.
(c) The atmosphere is transparent to the incoming short-wavelength radiations and is translucent to the long-wavelength infrared radiations.
(d) All of these

40. Greenhouse effect is due to

(a) accumulation of O_3 and depletion of CO_2
(b) accumulation of both O_3 and CO_2
(c) accumulation of CO_2 and depletion of O_3
(d) presence of green plants on the earth.

Assertion & Reasoning Based MCQs

For question numbers 41-50, a statement of assertion followed by a statement of reason is given. Choose the correct answer out of the following choices.

(a) Both assertion and reason are true, and reason is correct explanation of the assertion.
(b) Both assertion and reason are true, but reason is not the correct explanation of the assertion.
(c) Assertion is true, but reason is false.
(d) Assertion is false, but reason is true.

41. Assertion : There is always an interaction between neighbouring or distant ecosystems.
Reason : An ecosystem is recognised as self - regulating and self - sustaining entity.

42. Assertion : Pyramid of biomass may be upright or inverted.
Reason : Pyramid showing total biomass produced per unit time is always upright.

43. Assertion : Man is a social and cultured animal.
Reason : He developed socio-cultural environment and lives in it.

44. Assertion : Ozone depletion can be reduced by limiting the use of air conditioners and refrigerators.

Reason : Air conditioner and refrigerators release chlorofluorocarbons in the atmosphere that destroy ozone.

45. **Assertion :** Paper cups are better option than plastic cups for serving tea.
Reason : Paper cups are biodegradable and can even be disposed off by burning.

46. **Assertion :** The burning of substances at higher temperature to form ash is called incineration.
Reason : Incineration greatly reduces the volume of waste.

47. **Assertion :** If pesticide is present in water bodies then fish eating birds accumulate maximum amount of DDT in their bodies.
Reason : Pesticides are not metabolised within bodies of living organisms and get concentrated at each trophic level leading to bioaccumulation.

48. **Assertion :** Using jute bags while shopping is more environment friendly as compared to polythene bags.
Reason : Jute is biodegradable whereas polythene bag is non-biodegradable.

49. **Assertion :** A food chain comprises of producers and consumers.
Reason : Consumers can be herbivores, carnivores and omnivores.

50. **Assertion :** We live in troposphere.
Reason : Our atmosphere extends beyond troposphere also.

SUBJECTIVE TYPE QUESTIONS

Very Short Answer Type Questions (VSA)

1. Name the radiations that are absorbed by ozone blanket.

2. Give reason why ozone layer in the stratosphere is considered useful?

3. Rearrange the given members of food chain in the correct trophic level: frog, grass, snake, insect.

4. Why are green plants called 'producers'?

5. Why are plastics non-biodegradable substances?

6. We often use the word environment. What does it mean?

7. Why is lake considered to be a natural ecosystem?

8. 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

9. In a food chain, if 10,000 joules of energy is available to the producer, how much energy will be available to the secondary consumer to transfer it to the tertiary consumer?

10. Why is excessive use of CFCs a cause of concern?

Short Answer Type Questions (SA-I)

11. Differentiate between biodegradable and non-biodegradable substances.

12. Write two causes of depletion of ozone layer.

13. Grass → Grasshopper → Frog → Snake → Eagle
In the above food chain, which of the organism will have
(i) maximum available energy?
(ii) minimum available energy?

14. Producers always occupy the first trophic level in any food chain. Why?

15. Why are microorganisms like bacteria and fungi important in the ecosystem?

16. What is landfilling? How is it beneficial to the environment?

17. Why proposal of use of kulhads (disposable cups made of clay) in trains was set aside?

18. Stability of a biotic community in an ecosystem is inversely proportional to its diversity. Do you agree with this statement?

19. We do not clean ponds or lakes, but an aquarium needs to be cleaned. Why?

20. What does a trophic level represent in a food chain? State the position of autotrophs and herbivores in a food chain.

Short Answer Type Questions (SA-II)

21. Differentiate between food chain and food web.

22. Why only 4 or 5 trophic levels are present in each food chain?

23. Write three characteristics of energy transfer in the biosphere?

24. Mention the advantages of paper bags over plastic bags.

25. What will happen if all the deers are removed from the given food chain?

Plants → Deer → Tigers

26. (a) From the following group of organisms create a food chain which is most advantageous for human beings in terms of energy.

Hawk, Rat, Cereal plant, Goat, Snake, Human being

(b) State the possible disadvantage if the cereal plant is growing in soil rich in pesticides.
(c) Construct a food web using the organisms mentioned above.

27. 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?

28. Study the given food chain and discuss the effect of removal of any one of the trophic level from it.

Grasses → Deers → Lions

29. "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.

30. Write two harmful effects of using plastic bags on the environment. Suggest alternatives to the usage of plastic bags.

31. What do you mean by acid rain? Give some effective measures to control it.

32. Give suitable mechanism(s) for waste management in fertiliser industries.

33. What efforts have been made at international level for mitigating global change?

34. What will be the consequence of absence of decomposers in an ecosystem?

35. State the consequences of stratospheric zone depletion.

Long Answer Type Questions (LA)

36. "Energy flow in a food chain is unidirectional". Justify this statement. Explain how the pesticides enter a food chain and subsequently get into our body.

37. Explain the phenomenon of ozone depletion. What are the factors responsible for it? What are its consequences?

38. Length of food chains in an ecosystem is generally limited to three or four trophic levels. Why?

39. Name the wastes which are generated in your house daily. What measures would you take for their disposal?

ANSWERS

OBJECTIVE TYPE QUESTIONS

1. (d) : Humus is an abiotic component of an ecosystem. It is dark brown or black coloured decomposed organic matter. It increases the fertility of soil.

2. (b) : Grasshopper and cattle are herbivores, so they are primary consumers.

3. (d) : Food web helps in providing alternative pathways of food availability to make ecosystem more stable and checking the overpopulation of highly reproductive species.

4. (a) : The concentration of DDT increases, as it moves or travels along the food chains. Its concentration is maximum at top trophic level. This process is called biomagnification.

5. (a) : Shorter food chain provides more energy as only 10% energy is transferred to next trophic level. So if there are more trophic levels, less energy will be obtained by the organisms occupying top trophic level.

6. (b) : In a grazing food chain, primary consumers (herbivores) represent T_2 level. Green plants form T_1 level.

7. (c) : Deforestation is cutting of forest and it does not help in protection of our environment.

8. (c) : Now-a-days disposable paper cups are being generally used in trains for serving tea or coffee on daily basis. These paper cups are easily disposable and degradable so these are better than nondegradable plastic cups used earlier.

9. (a)

10. (c) : Of the total amount of energy that passes from one trophic level to another in a food chain, about 10% is stored in body tissues of organisms. So the highest amount of energy is stored in the producers and the least amount of energy is stored in top consumers. This is Lindemann's 10% energy law of ecosystem.

11. (a) : If there was no CO_2 in the atmosphere, the earth's temperature would have been less than the present temperature. CO_2 present in atmosphere traps the heat reflected back in space by acting as a greenhouse glass panel. That is why it is termed as greenhouse gas.

12. (d) : Polythene, detergent, PVC, plastic, bakelite and DDT are non-biodegradable. Non-biodegradable wastes are those which cannot be degraded or decomposed by the action of biological decomposers *i.e.*, bacteria and fungi.

13. (c) : Maximum energy is available at T_1 level. T_1 is the first trophic level and has 100% of energy formed by photosynthesis.

14. (c) : A food chain consists of various organisms present at various trophic levels, starting from producers and ending in carnivores with herbivores between these two. Following food chains are formed by group I and IV.

Group I - Grass $\rightarrow$ Rabbit $\rightarrow$ Wolf $\rightarrow$ Lion.

Group IV - Grass $\rightarrow$ Grasshopper $\rightarrow$ Frog $\rightarrow$ Snake $\rightarrow$ Eagle.

While, group II contains hawk and man as consumers but they both do not feed upon planktons, the producers given here. Thus a food chain cannot be formed in the case.

In group III herbivores are missing, so a food chain cannot be formed–

Grass $\rightarrow$? $\rightarrow$ Snake $\rightarrow$ Wolf $\rightarrow$ Tiger.

15. (b) : Fish that feeds on zooplanktons is a secondary consumer. In this food chain, zooplanktons are primary consumers and belong to second trophic level that feed on producers.

16. (a) : The pyramid of energy is always upright because according to the second law of thermodynamics, there is gradual decrease in available energy at successive trophic levels.

17. (b)

18. (a) : Crop field is an example of man made ecosystem.

19. (a) : Due to the phenomenon biomagnification, once DDT has entered into a food chain, it keeps on accumulating progressively at each trophic level. As man occupy the top level in any food chain, the concentration of DDT will be maximum in man.

20. (a) **21. (c)**

22. (d) Pyrolysis involves anaerobic destructive distillation of solid wastes at high temperature (650^0C - 1000^0C).

23. (c) : Synthetic polymers are non-biodegradable substances which are not decomposed biologically by the action of microbes.

24. (c)

25. (b) : Plastics, polythene bags and aluminium cans cannot be degraded by the action of microorganisms such as bacteria, fungi. Hence, they are non-biodegradable substances.

26. (c) : Enzymes are specific in their action and these specific enzymes are required for the break-down of a particular substance.

27. (b) : Minamata disease is a neurological disorder caused by methyl mercury poisoning. It was first reported near Minamata Bay in Japan in 1956. The symptoms include ataxia, numbness in hands and feet, muscle weakness, damage to hearing and speech.

28. (d) : Charles Elton developed the concept of ecological pyramid. After his name, these pyramids are called as Eltonian pyramids. According to Charles Elton, producers are present at the base of the pyramid and carnivores at the top. According to 10% law of energy transfer, energy goes on decreasing with increase in trophic levels. Thus, energy trapping is high at the base of the pyramid and lowest at top of the pyramid.

29. (d) : Increased use of plastic material in packaging has resulted in generation of lot of solid wastes. Dumping industrial chemical waste affects the soil fertility and subsequently reduces crop yield. Solid waste can block drains creating pools of water which can become breeding ground for mosquitoes and therefore, could increase the incidents of disease in the locality.

30. (b) **31. (a)**

32. (b) : Tiger is a secondary consumer in food chain B and tertiary consumer in food chain D.

33. (a) : Top consumer of food chain A will have maximum energy as it is the shortest food chain.

34. (d) : In food chain D, wild cat is the secondary consumer. Therefore, according to 10% law, amount of energy present in secondary consumer will be 200 KJ.

35. (b) : Food chain E belongs to aquatic ecosystem. Therefore, its pyramid of biomass will be inverted.

36. (b) : In the given pie chart, gases P, Q, R and S respectively are CO_2, CH_4, CFCs and N_2O. Methane is produced by incomplete combustion of biomass.

37. (c) : Methane (gas Q) is produced by incomplete biomass combustion and incomplete decomposition mostly by anaerobic methanogens. Flooded paddy fields, marshes and cattles are the major source of this gas.

38. (c) : CO_2 is the principal greenhouse gas that helps to keep the earth warm.

39. (d) **40. (c)**

41. (b) : A biotic community cannot live in isolation. The biotic community together with the physical environment forms an interacting system called the ecosystem. Ecosystems are self-regulating and self-sustaining units. An ecosystem is an area in which the inputs and outputs can be studied across its boundaries. For convenience, it is considered as a separate entity, but, it is important to recognise that the boundaries of ecosystem are indistinct and over- lapping. Some movement always occurs from one ecosystem to another in terms of energy and materials. All ecosystems are interconnected by flow of energy and transfer of materials with the neighbouring ecosystems, or even with distant ecosystems. For example, leaves of riverbank trees dropping in river water represent transfer of energy and material from terrestrial to aquatic ecosystem.

42. (b) : Pyramid of biomass is upright for terrestrial habitats. Maximum biomass occurs in producers. Inverted or spindle-shaped pyramids are obtained in aquatic habitats. The biomass of phytoplankton may be smaller than that of primary carnivores. However, if total biomass produced per unit time is calculated, maximum biomass occurs in producers. There is a progressive reduction of biomass found in herbivores, primary carnivores, secondary carnivores, etc. Therefore, if total biomass produced per unit time is calculated, the pyramid of biomass shall always be upright.

43. (a) : Man has developed the socio-cultural environment, in which he develops certain things through his efforts, skills, social institutions and tools. It results in the growth of society and advanced development of human powers.

44. (a) **45. (a)**

46. (b) **47. (a)**

48. (a) : Jute bags can be reused repeatedly for shopping and get decomposed when discarded. Polybags on the other hand keep on accumulating as solid waste and harm our environment. They can clog drainage, pollute river bodies and are extremely dangerous to grazing animals who chew them mistakenly. So, jute bags are more environment friendly than polybags.

49. (b) : A food chain always starts with producers or green plants who synthesise food. All consumers depend on green plants for food and energy directly or indirectly.

50. (b) : Troposphere is the part of atmosphere which extends from the surface of the earth to an altitude of 10 km. Life supporting conditions are found in troposphere. Besides troposphere, atmosphere consists of three other layers - stratosphere (10-60 km), mesosphere (60-100 km) and thermosphere (100 km and above).

SUBJECTIVE TYPE QUESTIONS

1. Ultraviolet (UV) radiations

2. Ozone layer in the stratosphere protects the living organisms including man from harmful UV radiations of the sun by absorbing most of them.

3. Grass $\rightarrow$ Insect $\rightarrow$ Frog $\rightarrow$ Snake

4. Green plants are called 'producers' because they prepare their own food in the presence of sunlight and chlorophyll by the process of photosynthesis.

5. Plastics are non-biodegradable substance because they cannot be broken down by the action of enzymes, bacteria or decomposers.

6. Environment can be defined as the physical or biological world where an organism lives. Literally speaking, an, organism's immediate surrounding constitutes its environment which includes both biotic and abiotic components around it.

7. Lake is an ecosystem where living organisms grow, reproduce and interact among each other as well as with abiotic components and carry out other activities in nature by themselves without any human interference, therefore it is referred to as a natural ecosystem.

8. Among the following organisms of the food chain, hawk being top consumer is present at topmost trophic level, hence will have the highest concentration of non-biodegradable chemicals due to a phenomenon known as biomagnification.

9. According to ten percent law, 10% of the energy of producer will be available to primary consumer, and 10% of this energy will be available to secondary consumer (100J) and so on.

Producer 10,000 J $\xrightarrow{10\%}$ Primary consumer 1,000 J $\xrightarrow{10\%}$ Secondary consumer 100 J $\xrightarrow{10\%}$ Tertiary consumer 10 J

10. CFCs or chlorofluorocarbons are potent compounds that release active chlorine in the atmosphere which reacts with ozone molecules present there to convert them to oxygen. This results in thinning of ozone layer. Hence, excessive use of CFCs is a cause of concern.

11. Differences between biodegradable and non-biodegradable substances are:

	Biodegradable substances	Non-biodegradable substances
(i)	They can be broken down into simplest form by biological processes.	They cannot be broken down by biological processes.
(ii)	They do not cause pollution.	They cause pollution.
(iii)	They remain for less time in the environment.	They remain for a long time in the environment.

12. Two causes of depletion of ozone layer are :

(a) Use of CFCs (chlorofluorocarbons) in refrigerators and aerosol sprayers.

(b) Release of pollutant nitrogen monoxide by jets.

13. (i) Grass will have the maximum available energy.

(ii) Eagle will have the minimum available energy.

14. Producers or green plants have chlorophyll which can trap the solar energy. The first trophic level in a food chain is a producer, i.e., those organisms which can produce food with the help of sunlight and chlorophyll by a process called photosynthesis.

15. Microorganisms like bacteria and fungi are important in the ecosystem because they decompose or break down the dead remains of animals and plants. This release the locked nutrients to be recycled in the ecosystem for reuse as raw materials by the producers.

16. Landfilling is a method of waste disposal in which solid wastes from urban areas are dumped in low lying areas and compacted by rolling with bulldozers. They are then covered with a layer of soil.

Landfilling is an effective method of solid waste disposal in urban areas and at the same time, it helps in reducing the pollution arising out of the waste.

17. Sometime back, use of kulhads (disposable cups made of clay) was suggested as an alternative of plastic cups. However, making of kulhads on such a large scale would have resulted in the loss of top fertile soil. Therefore, this proposal was set aside.

18. No, I do not agree with this statement. Stability of a biotic community is directly proportional to its diversity, number of species and their interactions. Larger the number of species within a community, more stable it will be.

19. An aquarium is an artificial or man-made ecosystem and thus, is not self-regulatory whereas, ponds and lakes are natural, self-sustaining and complete ecosystems. Therefore, ponds and lakes get cleaned by natural processes but an aquarium needs to be cleaned.

20. The various steps representing organisms in a food chain at which the transfer of food and energy takes place are called trophic levels.

The position of producers (or autotrophs) in a food chain constitute the first trophic level. They fix up sun's energy and make it available for consumers. The herbivores or primary consumers (which feed upon plants) constitute the second trophic level in a food chain.

21. Differences between food chain and food web are:

	Food chain	Food web
(i)	It is the single straight pathway process in which one organism consumes the other.	It is number of food chains interconnected at various trophic levels.
(ii)	Each organism of higher trophic level receives food from single type of organisms of lower trophic level.	Each organism of higher trophic level receives food from number of alternative organisms of the lower trophic level.
(iii)	It does not add adaptability in organism.	It increases adaptability in organism.
(iv)	Only the members of one trophic level compete for obtaining the same food.	Competition is among members of different species. It is less severe as a number of alternate foods are available.
(v)	Presence of separate or isolated food chains adds to instability of the ecosystem.	Presence of food webs increases the stability of the ecosystem.

22. The quantum of available energy in a food chain successively gets decreased at each trophic level. There is only 10% flow of energy from one trophic level to the next higher level. Second law of thermodynamics says that transformation of energy from one form to the other is inefficient and involves dissipation of unavailable energy. This loss of energy at successive trophic levels restricts the size of food chain in an ecosystem to maximum 4 to 5 steps. Hence, only 4 to 5 trophic levels are present in each food chain.

23. The following are the characteristics of energy transfer in the biosphere: (any three)

(i) Energy is supplied by the sun and it is not created in the biosphere. Energy is only converted from one form to another in the biosphere.

(ii) The flow of energy is unidirectional.

(iii) There is loss of energy as we go from one trophic level to the next in an ecosystem. At each transfer, generally 80-90% of energy is lost as heat in accordance with second law of thermodynamics.

24. The advantages of paper bags over plastic bags are :

(i) Paper bags can be recycled as they are biodegradable.

Their recycling does not produce poisonous gases like recycling of plastic bags.

(ii) Once discarded, paper bags can be recycled again easily, while plastic bags cannot be recycled easily as they clog machines and complicate the recycling processes.

(iii) Plastic bags kill thousands of marine animals every year as some animals confuse plastic bags with jellyfish which block the entrance to the stomach. Paperbags are a healthy, safe alternative to hazardous plastic bags.

(iv) Paper bags are finding favour with all consumers, government and even the environmentalists.

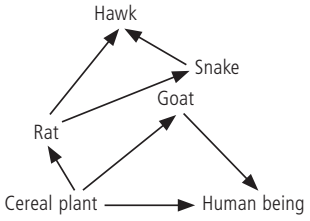
25. From the given food chain, if the deers are removed, the population of plants will increase as deers are herbivores and feed on plants whereas the population of tiger (that consume deer) will decrease, as food available for tiger would be less.

26. (a) A food chain which is most advantageous for human beings in terms of energy is:

Cereal plant $\rightarrow$ Human being

(b) If the cereal plant is growing in soil rich in pesticides, then these pesticides would be absorbed by growing plants along with water and minerals, when animals eat these cereal plants, these poisonous chemical pesticides go into their bodies through food. This increase in concentration of harmful pesticides in the body of living organisms at each trophic level of a food chain is called biological magnification. Pesticides are lethal to non-target species also. The extensive use of pesticides in agriculture can change the community of microorganisms living in soil.

(c)



27. Yes, the impact of removing all the organisms in a trophic level will be different for different trophic levels, *e.g.*, removal of all the producers (T_1) will adversely affect all the types of consumers including herbivores and carnivores, while the removal of all the herbivores will adversely affect only the carnivores but there will be increase in the number of the producers.

No, Removal of all the organisms of any trophic level will always adversely affect the ecosystem, *e.g.*, the removal of lions and tigers (top carnivores) will cause rapid increase in deer population, which will lead to rapid consumption of vegetation resulting in scarcity of vegetation and population crash of deer.

28. In the above food chain, if all the lions are removed, the population of deer will increase since there would not be any lion to kill them and to keep the deer population under control. This will lead to high consumption of grasses (producers) and may even eliminate them and if the deer population is removed instead of lions, it will lead to decrease of lion population since there will not be any prey. The lions may even resort to other preys such as domestic animals or man to survive. If the deer and lion operate in other food chains in a food web, then the removal of any one of them will lead to disruption of the food web and will cause disturbance in the ecosystem. In addition if the grasses (producers) are removed, then all life will come to an end. If there is no grass, there will be no herbivores. If there are no herbivores, then there will be no carnivores. Therefore, ultimately all organisms will die.

29. Pesticides are poisonous chemical substances which are sprayed over crop plants to protect them from pests and diseases. These chemical pesticides mix up with soil and water. From soil and water, these pesticides are absorbed by the growing plants along with water and other mineral's. When herbivorous animals feed on these plants the poisonous pesticides enter their bodies through the food chain. Similarly, when the carnivorous animals eat these herbivores, the pesticides get transferred to their bodies. Therefore, the plant products such as food grains, vegetables and fruits as well as meat of animals contain varying amounts of pesticide residues depending upon the trophic level they occupy in a food chain.

30. Two harmful effects of using plastic bags on the environment:

(i) Plastic bags are non-biodegradable substances which are not acted upon by microbes. So, they cannot be decomposed and therefore persist in the environment for a long time causing harm to the soil fertility and quality.

(ii) Plastic bags choke drains which result in waterlogging, that allows breeding of mosquitoes and hence leads to various diseases.

Jute bags and cloth bags are the alternatives to the polyethene bags.

31. Any precipitation or deposition having a pH lower than 5.6 is called acid rain. Acid rain occurs by the emission of sulphur dioxide and oxides of nitrogen that react with rain water and form acids.

Following measures can be taken to prevent and control acid rain:

(i) Acid rain is mainly caused due to air pollution. Air pollution can be reduced by using pollution-controlling equipment, such as scrubber.

(ii) Other sources for the generation of electricity, such as nuclear fuel or solar power can be used instead of using fossil

fuel to reduce the release of oxides of nitrogen and sulphur.

(iii) Cleaner fuels, such as LPG, CNG, etc., could be used in automobiles.

(iv) Use of neutralising agents such as powdered lime stone can be sprayed over areas that are prone to acid rain.

32. Industries involved in making inorganic fertilisers such as urea, potash, etc., cause air and water pollution by releasing harmful and toxic chemicals in air and water during the synthesis of the chemical fertilisers.

Measures required to be adopted for the management of these wastes are :

(i) The release of various pollutants directly in the air should be controlled and minimised by removing particulate matter and gaseous pollutants from foul air before its emission in the source.

(ii) The effluents should be treated and then discharged into the environment. Before discharging them in the water source they should be converted into less harmful, non-toxic materials.

33. Initiatives for mitigating global change are:

Montreal Protocol (16 September 1987) : A landmark international agreement to protect the stratospheric ozone by agreeing to limit the production and use of ozone depleting substances to half the level of 1986 and helping the developing countries to implement use of alternatives to CFCs.

Helsinki Declaration (May, 1989) : Montreal Protocol was ratified by 82 nations at Helsinki. They pledged to phase out CFCs by 2000.

Kyoto Protocol (December, 1997) : International conference held in Kyoto, Japan obtained commitments from different countries for developing alternatives to oxygen depleting substances (ODS) and reducing overall greenhouse gas emissions at a level 5% below 1990 level by 2008-2012.

Beijing Protocol (1999) – The protocol lays down steps to reduce emission of CFCs and other ozone depleting substances. It separates the efforts to be made by developing and developed countries.

34. In absence of decomposers, recycling of materials will not occur in biosphere. It is due to the reason that decomposers break down the complex organic substances like dead organisms, garbage, etc. into simple inorganic compounds, which go into the soil and used again by plants. From plants they enter the biosphere through food chain.

35. Stratosphere contains ozone layer which absorbs harmful UV radiations of the sun, protecting the living beings on earth from health consequences of stratospheric zone (ozone) defetion are:

(i) Cancers: UV radiations damage skin cells causing increase in incidences of skin cancer and skin ageing.

36. The producers convert solar energy into chemical energy in the form of organic compounds. The primary consumers (herbivores) derive their nutrition from the producers. According to the energy transfer law, only 10% of energy is transferred from one trophic level to the other. So, the energy that is captured by the producers does not revert to the sun and the energy transferred to the herbivores does not come back to the producers. It just keeps on moving to the next trophic level in a unidirectional way. That is why the flow of energy in the food chain is always unidirectional.

A large number of pesticides and chemicals are used to protect our crops from pests and diseases. Some of these chemicals are washed down from the soil, while some enter the water bodies. From the soil, they are absorbed by plants along with water and minerals; and from the water bodies, they are taken up by aquatic plants and animals. This is how these chemicals enter the food chain. As these chemicals cannot decompose, they accumulate progressively at each trophic level. This increase in the concentration of harmful chemicals with each step of the food chain is called biomagnification. As human beings occupy the top level in any food chain, these chemicals get accumulated in our bodies.

37. Ozone depletion means the thinning of ozone layer in the atmosphere. Many chemicals mainly chlorofluorocarbons are responsible for ozone depletion. These are widely used as coolants in refrigerators and air conditioners; in fire extinguishers; in aerosol sprayer and as propellants. Once released in the air, these chemicals produce `active chlorine' (Cl and ClO radicals) in the presence of UV radiations. These radicals, through chain reaction, then destroy the ozone by converting it into oxygen. A single active chlorine can deplete one lakh ozone molecules through chain reaction. Thinning of ozone layer allows ultraviolet (UV) radiations to pass through it which then strike the earth and cause harmful effects on man, animals and plants.

(i) UV radiations increase incidences of skin cancer and herpes.

(ii) UV radiations cause damage to eyes resulting in dimming of eye sight.

(iii) Cause damage to immune system hence, lowering the body's resistance.

(iv) Harmful UV radiations increase mortality of developing embryo in the mothers, uterus.

(v) These radiations decline the rate of photosynthesis in plants which ultimately increase the CO_2 concentration leading to global warming.

38. Energy flow is always unidirectional, moving successively through trophic levels. Solar energy is received and trapped by autotrophs which passes it to primary, secondary and tertiary consumers. During energy transfer from one trophic level to successive trophic level, 90% of energy is lost and only 10% energy reaches the next trophic level, (Lindemann's 10% law). Thus, after three or four trophic levels, negligible amount of energy is left to be passed to the next trophic levels. That is why length of food chains is limited to three or four trophic levels only. According to 10% law: If a producer produces 1000 KJ energy, then T_2 level (second trophic level) will get 100 KJ, T_3 will get 10 KJ of energy, T_4 will get 1 KJ and for T5 0.1 KJ energy will be left. More number of trophic levels will get further decreased amount of energy which is neither economical, nor feasible. Thus in nature, length of food chains is generally limited to three or four trophic levels.

39. The types of waste generated in a house are—

(i) Kitchen wastes like vegetable and fruit peel, rind, used tea leaves.

(ii) Empty milk pouches, polythene bags, empty cartons, etc.

(iii) Waste paper (newspaper, paper bags, packing paper).

(iv) Used tooth picks and ear buds.

(v) Dust and other sweepings.

Measures for household waste disposal–

At an individual's end following measures should be taken:

(i) Reuse of maximum possible materials

(ii) Separation of biodegradable and non-biodegradable wastes

(iii) Biodegradable wastes should be used for composting

(iv) Non-biodegradable wastes should be disposed off at suitable places from where municipal authorities can pick them up and dispose properly and scientifically.