Chapter 5

Our Environment

- **Environment** is the sum total of all external factors, substances, living beings, and conditions that surround an organism and influence the same without becoming its part. It consists of both living and non-living components.
- The waste materials produced by the various activities of man and animals can be divided into two main groups :
  1. **Biodegradable wastes :** The waste materials which can be broken down to non-poisonous substances in nature in due course of time by the action of micro-organisms like certain bacteria, are called biodegradable wastes. *E.g.* animal bones, leather etc.
  2. **Non-biodegradable wastes :** The waste materials which cannot be broken down into non-poisonous or harmless substances in nature are called non-biodegradable wastes. *E.g.*, plastics, glass objects etc.
- **Ecosystem**

  An **ecosystem** is a self-contained unit of living things (plants, animals and decomposers), and their non-living environment (soil, air and water). *E.g.* a forest, a pond, a lake, a greenland etc.

  There are two components of an ecosystem :

  (i) Biotic component of an ecosytem is a community of living organisms like plants and animals which is made up of many different inter-dependent populations. It includes three types of organisms:

  A. Producer (which synthesise their own food. *E.g.* all green plants)

  B. Consumer (which depends upon the others for food. *E.g.* animals) and

  C. Decomposer/saprophyte (which consume the dead remains of other organism. *E.g.* some bacteria, fungi).

  Those animals which eat both plants and animals, are called **omnivores**.

  Planktons are very minute or microscopic organisms freely floating on the surface of water in a pond, lake, river or ocean.

  (ii) Abiotic component of an ecosystem includes the physical environment like soil, water, air, and the nonliving components of the environment like sodium, nitrogen, hydrogen, etc.
- **Food Chains and Food Webs**
  - The sequence of living organisms in a community in which one organism consumes another organism to transfer food energy, is called a **food chain**.
  - The food chain starts from **producers** and all the food chain starts from the original source of all food i.e. green plant. Next in the chain is always the plant eater or the **herbivore** which is called the **primary consumer**. The primary consumers are eaten by **flesh eater** the **secondary** and **tertiary consumers**. Certain food chains may be very long and may extend to fourth, fifth or even higher order consumers.

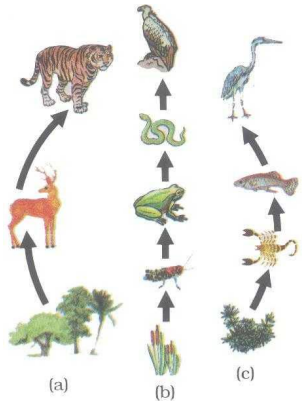


Fig. Food Chain

- A food chain is unidirectional where transfer of energy takes place in only one direction.

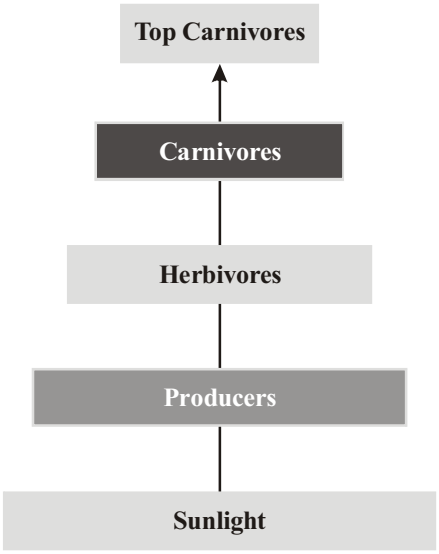
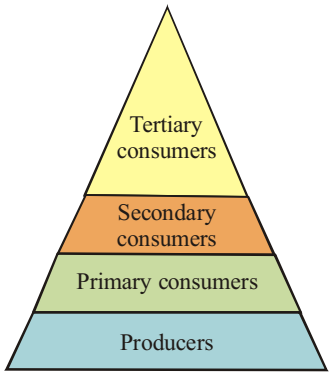


Fig : Diagram showing flow of energy in an ecosystem

- In aquatic ecosystem of the biosphere, the food chain starts with microscopic free floating plants (phytoplankton).

  Algae ⟶ Small animals ⟶ Fish ⟶ Big fish
  (phytoplankton) (zoo-plankton)
- The various steps in a food chain at which the transfer of food (or energy) takes place are called **trophic levels**.



Trophic levels

- When green plants are eaten by primary consumers, a great deal of energy is lost as heat to the environment, some amount goes into digestion and in doing work and the rest goes towards growth and reproduction. An average of 10% of the food eaten is turned into its own body and made available for the next level of consumers.
- The length and complexity of food chains vary greatly. Each organism is generally eaten by two or more other kinds of organisms which in turn are eaten by several other organisms. So instead of a straight line food chain, the relationship can be shown as a series of branching lines called a **food web**.
- Ten percent law states that only 10 percent of the energy entering a particular trophic level of organisms is available for transfer to the next higher trophic level.

- **Environmental Problems**

(i) Global Warming

Greenhouse gases such as carbon dioxide gas increases the temperature of the earth. These gases remain close to the surface of earth, forming an insulating layer. The surface becomes hot due to the solar radiations. This radiation is normally reflected back into the space. However, due to the presence of the insulating layer the heat remains within the earth's atmosphere and increases its temperature. The reduction in the forest cover also contributes to the heating of earth. This is called global warming. It results in the melting of polar ice caps, rise in the level of ocean waters.

(ii) Ozone Depletion

- **Ozone (O_3)** is a molecule formed by three atoms of oxygen. At the higher levels of the atmosphere, ozone performs an essential function. It shields the surface of the earth from ultraviolet (UV) radiation from the Sun.

$$O_2 \xrightarrow{UV} O + O$$
$$O_2 + O \rightarrow O_3$$
(Ozone)

- The depletion of ozone layer is due to **CFCs (chloro fluorocarbons), insulating foams, solvents** and **aerosols.**
- Thinning of ozone layer would allow penetration of ultraviolet light into earth's atmosphere causing, blindness, skin cancers and mutations.

(iii) Waste

- Accumulation of wastes due to its improper disposal is a major problem.
- The increase in concentration of harmful chemical substances like pesticides in the body of living organisms at each trophic level of a food chain is called biological magnification.
- The disposal of waste should be done in a scientific way.
- Some of the important modes of waste disposal are :
  (i) Recycling (ii) Preparation of compost
  (iii) Incineration (iv) Landfill
  (v) Sewage treatment

Exercise 1

DIRECTIONS : This section contains multiple choice questions. Each question has 4 choices (1), (2), (3) and (4) out of which only one is correct.

1. Carnivores represent
   (1) primary consumers
   (2) secondary and tertiary consumers
   (3) reducers
   (4) zooplankton
2. A non-biodegradable waste is
   (1) garbage (2) metallic articles
   (3) sewage (4) waste paper
3. In every food chain green plants are
   (1) decomposers (2) producers
   (3) consumers (4) None of the above
4. Biodegradable substances are those substances that
   (1) can be broken down by the action of bacteria or other saprophytes.
   (2) cannot be acted upon by physical processes like heat and pressure.
   (3) persist in the environment for a long time.
   (4) may harm the various members of the ecosystem.
5. Which of the following is non-biodegradable substance?
   (1) Polythene (2) Cotton cloth
   (3) Leaves (4) Vegetable peels
6. All the interacting organisms in an area together with the non-living constituents of the environment form
   (1) community (2) ecosystem
   (3) atmosphere (4) soil
7. An ecosystem consists of
   (1) biotic component comprising living organisms
   (2) abiotic component comprising physical factors
   (3) Both (1) and (2)
   (4) None of these
8. Which is abiotic component of ecosystem?
   (1) Humus (2) Bacteria
   (3) Plants (4) Fungi
9. Who coined the term ecosystem?
   (1) Tansley (2) Odum
   (3) Warming (4) Darwin

10. Which chemical has been replaced recently?
(1) Malathion
(2) Chlorofluorocarbons
(3) Chloroform
(4) Ethylene dibromide

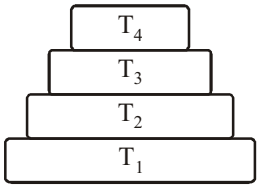
11. Growth, reproduction and other activities of living organisms are affected by
(1) abiotic components only
(2) biotic components only
(3) both biotic and abiotic components
(4) some other factors

12. Types of ecosystems are
(1) mountains and aquarium
(2) natural ecosystems like forests, ponds and lakes
(3) artificial ecosystems like gardens and crop fields
(4) Both (2) and (3)

13. All consumers whether herbivores, carnivores or parasites depend on _____ directly or indirectly for their sustenance by feeding on other consumers
(1) producers or plants
(2) air
(3) water
(4) light

14. The micro organisms that break-down the complex organic substances of dead remains and waste products of organisms into simpler inorganic substances are called
(1) vultures (2) decomposers
(3) omnivores (4) None of these

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

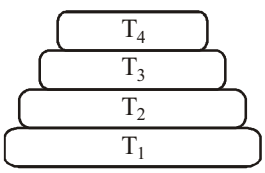


(1) T_4 (2) T_2
(3) T_1 (4) T_3

16. Disposable plastic plates should not be used because
(1) they are made of materials with light weight.
(2) they are made of toxic materials.
(3) they are made of biodegradable materials.
(4) they are made of non-biodegradable materials.

17. Accumulation of non-biodegradable pesticides in the food chain in increasing amount at each higher trophic level is known as
(1) eutrophication
(2) pollution
(3) biomagnification
(4) accumulation

18. In the given figure the various trophic levels are shown in a pyramid. At which trophic level is maximum energy available?
(1) T_4
(2) T_2
(3) T_1
(4) T_3



19. The decomposers in an ecosystem
(1) convert inorganic material to simpler forms.
(2) convert organic material to inorganic forms.
(3) convert inorganic materials into organic compounds.
(4) do not breakdown organic compounds.

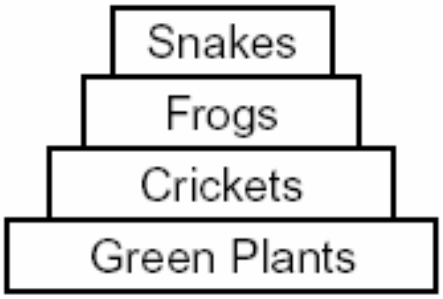
20. All green plants and certain blue green algae make their food by making organic compounds like sugar and starch from inorganic substances using the radiant energy of the Sun in presence of chlorophyll. The process is
(1) respiration (2) photosynthesis
(3) oxidation (4) sustenance

21. Interdependence of organisms on other organisms for their sustenance is described by
(1) ecosystem (2) biosphere
(3) food chains (4) heterotrophs

22. Each step or level of the food chain forms a
(1) trophic level (2) food web
(3) layer (4) crust

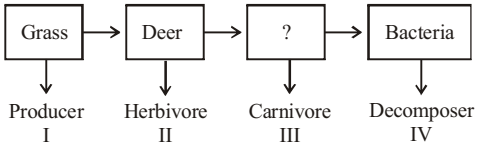
23. Interactions among various components of the environment involves _____ from one component of the system to another.
(1) flow of hereditary information
(2) flow of food particles
(3) flow of energy
(4) flow of oxygen

24. The diagram below shows a food pyramid.



Which level of the food pyramid contains consumers with the least biomass?
(1) Snakes (2) Frogs
(3) Crickets (4) Green plants

25.



Carnivore is represented by the animal
(1) Cow (2) Buffalo
(3) Lion (4) None

26. Which of the statement is incorrect?
(1) All green plants and blue green algae are producers.
(2) Green plants get their food from organic compounds.
(3) Producers prepare their own food from inorganic compounds.
(4) Plants convert solar energy into chemical energy.

27. In the given food chain, suppose the amount of energy at fourth trophic level is 3 kJ, what will be the energy available at the producer level ?
Grass → Grasshopper → Frog → Snake → Hawk
(1) 3 kJ (2) 30 kJ
(3) 300 kJ (4) 3000 kJ

28. Excessive exposure of humans to UV-rays results in
(i) damage to immune system
(ii) damage to lungs
(iii) skin cancer
(iv) peptic ulcers
(1) (i) and (ii) (2) (ii) and (iv)
(3) (i) and (iii) (4) (iii) and (iv)

29. How many trophic levels are usually present in a food chain?
(1) One (2) Four
(3) Numerous (4) Five

30. In a terrestrial ecosystem, green plants capture 1% of the energy of sunlight that falls on their leaves and convert it into
(1) food energy (2) muscular energy
(3) electrical energy (4) potential energy

31. How much energy is transferred from one level of consumers to the next?
(1) All of it
(2) Only organic matter is transferred
(3) 10% of the energy received by it
(4) 50% of the energy received by it

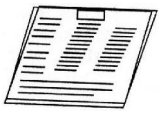
32. The energy transferred from one level to the next higher level
(1) can be transferred back to the previous level
(2) cannot be transferred back to the previous level
(3) is consumed by it in doing body functions or lost to the environment
(4) both (2) and (3)

33. Carefully observe the diagram(s) given below


Leaves

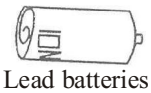

Banana peel


Flower


Paper

Which type of waste is represented by figures shown above?
(1) Biodegradable (2) Non-biodegradable
(3) Both (1) and (2) (4) None

34. Carefully observe the diagram(s) given below


Lead batteries


Paint


Plastic bag


Aluminium container

Which type of waste is represented by following figure ?
(1) Non-biodegradable (2) Bio-degradable
(3) Both (4) None

35. 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
(1) (iii) (2) (iv)
(3) (i) and (iii) (4) (ii) and (iv)

36. Which group of organisms are not constituents of a food chain ?
(i) Grass, lion, rabbit, wolf
(ii) Plankton, man, fish, grasshopper
(iii) Wolf, grass, snake, tiger
(iv) Frog, snake, eagle, grass, grasshopper
(1) (i) and (iii) (2) (iii) and (iv)
(3) (ii) and (iii) (4) (i) and (iv)

37. The percentage of solar radiation absorbed by all the green plants for the process of photosynthesis is about
(1) 1% (2) 5%
(3) 8% (4) 10%

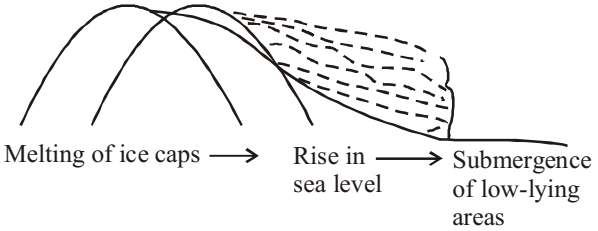
38. Our food contains varying amounts of pesticide residues because of
(1) biological magnification
(2) the chemicals supplied during agricultural processes are retained by the fruits and seeds through soil and water
(3) chemical reactions between spices and other cooking materials
(4) Only (1) and (2)

39. Which of the following steps is not relevant to formation of ozone?
(1) Ozone is a poisonous gas.
(2) UV radiations from sunlight split and oxygen molecule into atomic oxygen.
(3) Oxygen molecule combine with the atomic oxygen to form ozone.
(4) Ozone is formed at the higher levels of the atmosphere.

40. Preservation of the Ozone layer
(1) is important because it helps in stopping harmful UV radiations
(2) is endangered by CFCs
(3) Both (1) and (2)
(4) is not necessary as it will give us more of oxygen

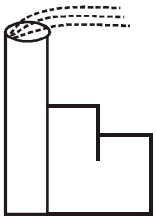
41. Disposal of garbage can be made eco-friendly
(1) segregating it into biodegradable and non-biodegradable bins.
(2) treating the biodegradable waste separately into some useful forms.
(3) treating the industrial waste and sewage before disposing them into water bodies.
(4) All of these.

42. Carefully observe the diagram(s) given below



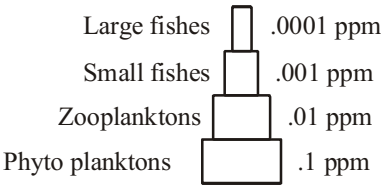
Cause of following effects is
(1) global warming (2) ozone depletion
(3) acid rain (4) None

43. Carefully observe the diagram(s) given below



Which type of air pollutants is released from the chimney ?
(1) CO_2 (2) CH_4
(3) Smoke (4) NO_2

44. Carefully observe the diagram(s) given below



Following figure represents the phenomenon :
(1) Bioaccumulation (2) Biomagnification
(3) Both (1) and (2) (4) None

45. This is an inverted pyramid
(1) Pyramid of number in a grassland
(2) Pyramid of energy in pond system
(3) Pyramid of biomass in a grassland
(4) Pyramid of biomass in pond ecosystem

46. In an ecosystem, one of the following occurs as abiotic compounds
(1) Flow of energy (2) Cycling of materials
(3) Consumers (4) Both (1) and (2)

47. Decomposers are
(1) Animalia and Monera
(2) Protista and Monera
(3) Fungi and Plantae
(4) Bacteria and Fungi

48. Greater use of disposable packaging materials is affecting the environment because
(1) they are more convenient to use.
(2) they are increasing non-biodegradable waste.
(3) they are hygienic and non-toxic for humans.
(4) All of these

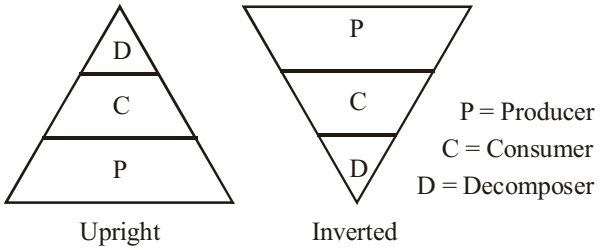
49. While on an excursion, you like to have tea in a
(1) disposable paper cup
(2) kulhad of clay
(3) disposable plastic cup
(4) any one that is available

50. In an ecosystem, there were grass, plants, rats, dogs, deer, horses and lions. Will it sustain?
(1) No, it has producers, consumers but no decomposers
(2) Yes, it has producers and consumers
(3) No, dogs will not get their favourite food cat
(4) Yes, it has got all the levels required for transfer of energy

51. The food chain, in which micro organisms breakdown the energy rich compounds is called
(1) ecosystem
(2) detritus food chain
(3) parasitic food chain
(4) predator food chain

52. The sequence of species through which the organic molecules in a community pass is
(1) pyramid of energy (2) nutrient cycle
(3) food chain (4) food web

53. Carefully observe the diagram(s) given below

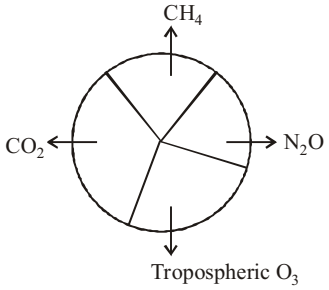


Which type of pyramid best represents the pyramid of energy ?
(1) Upright (2) Inverted
(3) Both (4) None

54. [ ] → Zooplanktons → Fish larva → Small fish → Large fish
1st trophic level in the aquatic food chain is represented by
(1) phytoplanktons (2) trees
(3) grasses (4) hawks

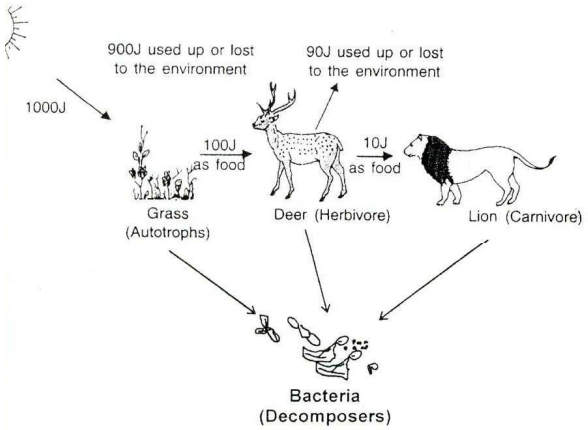
55. Food webs are prominent in an ecosystem because
(1) one consumer is not dependent on a single kind of food from the same food chain
(2) interlinking of food chains lead to formation of food webs
(3) Both (1) and (2)
(4) None of these

56. Carefully observe the diagram(s) given below



% concentration of which greenhouse gas is maximum ?
(1) CO_2 (2) CH_4
(3) N_2O (4) Tropospheric O_3

57. Carefully observe the food chain given below



Amount of energy lost at each trophic level is represented by law :
(1) Law of 8% (2) Law of 10%
(3) Law of 15% (4) Law of 20%

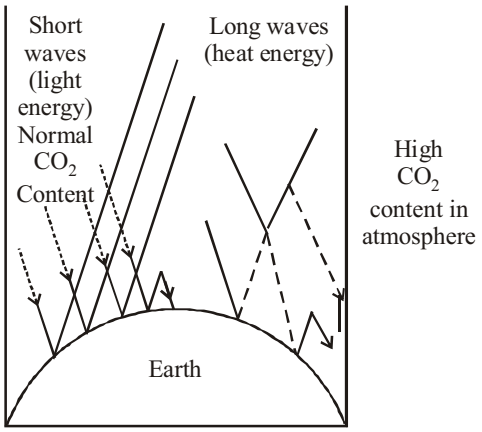
58.

Exosphere
Ionosphere
Stratosphere
Troposphere

O_3 is concentrated in which layer of atmosphere
(1) Troposphere (2) Exosphere
(3) Stratosphere (4) None

59. Suggest the correct sequence of various autotrophic levels likely in the food chain involving plants, birds, lions, snakes and ants.
(1) Plants, birds, snakes, lions and ants
(2) Plants, ants, birds, snakes and lions
(3) Plants, birds, lions, snakes and ants
(4) Plants, snakes, ants, birds, lions

60. Carefully observe the diagram(s) given below



Following figure represents the phenomenon
(1) Acid rain (2) Greenhouse effect
(3) Ozone depletion (4) None

Exercise 2

Matching Based MCQ

DIRECTIONS (Qs.1 to 5) : Match Column-I with Column-II and select the correct answer using the codes given below the columns.

1.

	Column I	Column II
(A)	Tundra	(p) This area on the planet has permanently frozen soil that does not allow for the growth of large plants.
(B)	Grassland	(q) The area on the planet has few trees, very fertile soil and usually many species of grasses. The rainfall amounts are low and the rain is more abundant during the summer months.
(C)	Tropical rainforest	(r) This biome is usually located near the equator. Rainfall amounts are very high, vegetation is dense and soil quality is poor.
(D)	Savanna	(s) A type of grassland biome that experiences rainy seasons and long periods of drought.

(1) A – (p); B – (q); C – (r); D – (s)
(2) A – (q); B – (p); C – (r); D – (s)
(3) A – (q); B – (p); C – (s); D – (r)
(4) A – (q); B – (s); C – (p); D – (r)

2.

	Column I	Column II
(A)	Grass	(p) Primary carnivore
(B)	Grasshopper	(q) Secondary carnivore
(C)	Frog	(r) Producer
(D)	Hawk	(s) Primary consumer

(1) A – (s); B – (r); C – (p); D – (q)
(2) A – (r); B – (s); C – (p); D – (q)
(3) A – (r); B – (s); C – (q); D – (p)
(4) A – (r); B – (q); C – (s); D – (p)

3.

	Column I	Column II
(A)	Eastern Ghats	(p) Western and Eastern Himalayas
(B)	Estuarine ecosystem	(q) Rajasthan, Punjab and part of Gujarat
(C)	Indus plains	(r) West Bengal and Andaman Nicobar
(D)	Arctic zone	(s) Cape Comarine to Gujarat

(1) A – (r); B – (s); C – (p); D – (q)
(2) A – (s); B – (r); C – (p); D – (q)
(3) A – (s); B – (r); C – (q); D – (p)
(4) A – (s); B – (q); C – (r); D – (p)

4.

	Column I	Column II
(A)	Third trophic level	(p) Producers
(B)	Accumulation of pesticides at higher trophic level	(q) Carnivores
(C)	Green plants	(r) Unidirectional
(D)	Flow of energy in an ecosystem	(s) Biomagnification

(1) A – (p); B – (q); C – (r); D – (s)
(2) A – (q); B – (p); C – (r); D – (s)
(3) A – (q); B – (p); C – (s); D – (r)
(4) A – (q); B – (s); C – (p); D – (r)

5.

Column I	Column II
(A) Consists of 3-atoms of oxygen	(p) CFCs
(B) Main cause of depletion of ozone layer	(q) Decomposes
(C) Second trophic level	(r) Ozone
(D) Break-down of dead organic compounds	(s) Herbivore

(1) A – (r); B – (p); C – (s); D – (q)
(2) A – (p); B – (r); C – (s); D – (q)
(3) A – (p); B – (r); C – (q); D – (s)
(4) A – (p); B – (q); C – (r); D – (s)

Statement Based MCQ

6. Consider the following statements :
(a) Waste are of two types, biodegradable and non-biodegradable.
(b) Blue-green algae are producers.
(c) Biodegradable wastes should be separated and kept in blue colour bins for garbage collectors.
Which of these statement(s) is/are correct ?
(1) (a) and (b) (2) (b) and (c)
(3) (a), (b) and (c) (4) None of these

7. Consider the following statements :
(a) Ozone is formed in stratosphere by action of ultravoilet radiations on oxygen.
(b) Carbon dioxide causes depletion of ozone layer thereby allowing more UV-radiations to reach the earth.
Which of these statement(s) is/are correct ?
(1) (a) only (2) (b) only
(3) Both (a) and (b) (4) Neither (a) nor (b)

8. Consider the following statements :
(a) Earth is kept warm due to green house flux.
(b) The reproduction and other activities of living organisms are affected by the abiotic components of ecosystem.
(c) Ecology is the scientific study of the interaction of organisms with each other and the environment.
Which of these statement(s) is/are correct ?
(1) (a) and (b) (2) (b) and (c)
(3) (a), (b) and (c) (4) None of these

9. Consider the following statements :
(a) Food ensures survival of all types of trophic levels.
(b) The energy takes place from autotrophs to the heterotrophs.
(c) Organisms can make organic compounds from inorganic substances by using the radiant energy of the sun in the presence of chlorophyll.
Which of these statement(s) is/are correct ?
(1) (a) and (b) (2) (b) and (c)
(3) (a), (b) and (c) (4) None of these

10. Consider the following statements :
(a) The interlocking pattern of various food chains is referred as food web.
(b) In general, food webs consist of producers, consumers, and decomposers.
Which of these statement(s) is/are correct ?
(1) (a) only (2) (b) only
(3) Both (a) and (b) (4) Neither (a) nor (b)

11. Consider the following statements :
(a) The abiotic components of the environment are the living factors.
(b) An ecosystem is made up of one type of community.
Which of these statement(s) is/are correct ?
(1) (a) only (2) (b) only
(3) Both (a) and (b) (4) Neither (a) nor (b)

12. Consider the following statements :
(a) The amount of usable energy remains constant as it is passed from one trophic level to another.
(b) The energy within an ecosystem is fixed and never changes.
Which of these statement(s) is/are correct ?
(1) (a) only (2) (b) only
(3) Both (a) and (b) (4) Neither (a) nor (b)

13. Consider the following statements :
(a) Human population and technology are having a destructive impact on the biosphere.
(b) The oxides of nitrogen and sulfur, when mixed with water in the air, are the chief components of acid rain.
Which of these statement(s) is/are correct ?
(1) (a) only (2) (b) only
(3) Both (a) and (b) (4) Neither (a) nor (b)

Passage Based MCQ

DIRECTIONS (Qs. 14 to 19) : Read the passage(s) given below and answer the questions that follow.

PASSAGE-1

Energy is the capacity to do work. Solar energy is transformed into chemical energy by the process of photosynthesis, and is stored in plant tissue and then transformed into mechanical and heat forms during metabolic activities.

The energy, in the biological world, flows from the sun to plants and then to all heterotrophic organisms such as microorganisms, animals and man. Energy flow is the key function in an ecosystem and it is unidirectional.

The study of energy transfer at different trophic level is known as 'Bioenergetics'.

14. 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
(1) 5 kJ (2) 50 kJ
(3) 500 kJ (4) 5000 kJ

15. Flow of energy in an ecosystem is always
(1) unidirectional (2) bidirectional
(3) multi-directional (4) no specific direction

16. In a food chain, the third trophic level is always occupied by
(1) carnivores (2) herbivores
(3) decomposers (4) producers

PASSAGE-2

We generate several types of wastes which are classified into two categories *i.e.*, (i) Biodegradable wastes and (ii) Non-Biodegradable wastes.

The non-biodegradable wastes generated by us are metallic cans, bottles, cartoons, polythene pouch and bags, plastic broken items, chemicals in the form of medicines, insecticides, pesticides, chemical fertilizers, wrappers etc.

These waste pollute the air, soil and water. These waste heaps become the shelter of housefly, mosquitoes, bacteria and many other micro-organisms. They increase their number and spread several types of disease in animals and human beings.

The aquatic plants and animals accumulate chemicals present in the water in their bodies. When these are taken by human beings they become patient of several types of diseases. Some amount of chemicals are mixed with the soils of crop fields from where these are with drawn by the plants. These chemicals accumulate when these plants are eaten up cause several types of diseases in us.

17. A biodegradable waste is
(1) polythene bags (2) broken glass and crockery
(3) livestock waste (4) discarded plastic

18. A non-biodegradable waste is
(1) garbage (2) metallic articles
(3) sewage (4) waste paper

19. Accumulation of non-biodegradable pesticides in the food chain in increasing amount at each higher trophic level is known as
(1) eutrophication (2) pollution
(3) biomagnification (4) accumulation

Assertion Reason Based MCQ

DIRECTIONS (Qs. 20 to 27) : Following questions consist of two statements, one labelled as the **'Assertion'** and the other as **'Reason'**. You are to examine these two statements carefully and select the answer to these items using the code given below.

Code :
(1) Both A and R are individually true and R is the correct explanation of A:
(2) Both A and R are individually true but R is not the correct explanation of A.
(3) A is true but R is false
(4) A is false but R is true.

20. **Assertion :** The crown fires are most destructive as they burn the tree top.
Reason : Due to crown fire the temperature of that area may rise upto 700°C.

21. **Assertion :** Abiotic component of an ecosystem involves cycling of material and flow of energy.
Reason : This is essential to keep biotic factors alive.

22. **Assertion :** In an ecosystem, the function of producers is to convert organic compounds into inorganic compounds.
Reason : Green plants, the producers transduce solar energy.

23. **Assertion :** Trophic levels are formed by only plants.
Reason : Food chains and webs are formed due to linked organisms on basis of their nutrition.

24. **Assertion :** Ecology is study of relationship between living organisms and their environment.
Reason : The biotic community and non-living environment of an area function together to form an ecosystem.

25. **Assertion :** Supersonic jets cause pollution as they thin out ozone.
Reason : Depletion of ozone cause green house effect.

26. **Assertion :** Tropical rain forests are disappearing fast from developing countries such as India.
Reason : No value is attached to these forests because these are poor in biodiversity.

27. **Assertion :** Animals adopt different strategies to survive in hostile environment.
Reason : Praying mantis is green in colour which merges with plant foliage.

Correct Definition Based MCQ

28. Pyramid of biomass is
(1) a graphic representation of total amount of organic matter in an ecosystem at any time per unit area at different trophic levels.
(2) a graphic representation of number of individuals of different trophic levels in a food chain.
(3) a graphic representation of amount of energy trapped per unit time and area in different trophic level of a food chain.
(4) a graphic representation of amount of energy evolved per unit time and area in different trophic level of a food chain.

29. Ecosystem is
(1) a self-sustaining structural and functional unit of the lithosphere.
(2) a self-sustaining structural and functional unit of the biosphere.
(3) a self-sustaining structural and functional unit of the hydrosphere.
(4) a self-sustaining structural and functional unit of the atmosphere.

30. Food web is
(1) a network of food chains operating in an ecosystem which get connected at various trophic levels.
(2) a linear food chain operating in an ecosystem which get connected two trophic levels.
(3) a network of food chains operating in an ecosystem which is not connected to various trophic levels.
(4) a linear food chain usually consists of 3-4 trophic levels.

31. Bioremediation is
(1) a technology for cleaning the environment with biological options such as microbes and plants.
(2) a technology for cleaning the environment by chemical methods such as fertilizers, DDT etc.
(3) a technology for cleaning the environment by physical methods such as temperature, pressure, etc.
(4) a technology for cleaning the aquatic life like ponds, swamps, rivers by biological methods.

Feature Based MCQ

32. On the basis of following features identify correct option.
(I) They decompose into soil.
(II) They are degraded by microorganisms such as bacteria and fungi.
(III) They are not biologically magnified.
(1) Non-biodegradable wastes
(2) Biodegradable wastes
(3) Biomedical wastes
(4) Commercial wastes

33. On the basis of following features identify correct option.
(I) It means burning of substances at very higher temperature (above 1000°C) to form ash.
(II) All organic matter present in the waste is removed as carbon dioxide and water.
(1) Biological reprocessing
(2) Sanitary landfill
(3) Bioremediation
(4) Incineration

34. On the basis of following features identify correct option.
(I) It is a graphic representation of number of individuals of different trophic levels in a food-chain in an ecosystem.
(II) Pyramid is upright in case of grassland, and pond ecosystem, where the number of organisms decrease from producer level to top carnivore level.
(1) Pyramid of biomass (2) Pyramid of energy
(3) Pyramid of numbers (4) Both (1) and (2)

35. On the basis of following features identify correct option.
(I) The concentration of greenhouse gases grows, more heat is trapped in the atmosphere and less escapes back into space.
(II) It changes the climate and alters weather patterns, which may hasten species extinction, influence the length of seasons, cause coastal flooding etc.
(1) Acid rain (2) Drought
(3) Global warming (4) Flood

Hints & SOLUTIONS

Exercise 1

1. **(2)** **2.** **(2)** **3.** **(2)**

4. **(1)** The substances which get decomposed by the action of bacteria or some other saprophyte or some physical processes under atmospheric conditions are biodegradable substances.

5. **(1)** Polythene is a non-biodegradable substance as it not affected by bacteria.

6. **(2)** All the living and non-living organisms interact with each other in an ecosystem.

7. **(3)** Biotic component comprising living organisms and Abiotic component comprising physical factors constitute an eco-system.

8. **(1)** **9.** **(1)** **10.** **(2)**

11. **(3)** Continuous interaction between living and non living things affects the growth, reproduction and other activities of the living organisms.

12. **(4)** Both natural ecosystems like forests, ponds and lakes or artificial ecosystems like gardens and crop fields are habitat to several living organisms.

13. **(1)** Herbivores eat plants and get eaten by carnivores. Parasites feed on plants, herbivores and carnivores.

14. **(2)** Decomposers are the micro organisms that break-down the complex organic substances of dead remains and waste products of organisms into simpler inorganic substances, which get mixed with soil as minerals.

15. **(1)** **16.** **(4)** **17.** **(3)** **18.** **(3)**

19. **(2)**

20. **(2)** All green plants and certain blue green algae do photosynthesis in presence of sunlight and chlorophyll.

21. **(3)** Food chains represent the interdependence of organisms for their fulfilling their energy needs.

22. **(1)** Each step or level of the food chain forms a trophic level.

23. **(3)** Various components of the environment involves the flow of energy.

24. **(3)** **25.** **(3)** **26.** **(2)** **27.** **(4)**

28. **(3)**

29. **(2)** There are four levels: Level 1 of producers, Level 2 of herbivores, Level 3 of carnivores and Level 4 of vultures. The levels are not clearly demarcated as interlinking also takes place.

30. **(1)** Green plants capture 1% of the energy of sunlight that falls on their leaves for carrying out photosynthesis. Rest of the energy is used to warm or evaporate water, carrying out various other natural phenomenons or even get reflected by shining snow.

31. **(3)** 10% of the energy received by one level is passed on to the next level. Rest of the energy is consumed by it for carrying out its body functions like growth, respiration, movement etc.

32. **(2)** The energy transferred from a lower level to the higher level only and not vice versa

33. **(1)** **34.** **(1)** **35.** **(4)** **36.** **(3)**

37. **(1)**

38. **(4)** Biological magnification is the process in which the chemicals supplied as fertilizers or pesticides during agricultural processes enter into the plants along with water through their roots. These are retained by the fruits and seeds which are consumed by humans or animals.

39. **(1)** 'Ozone is a poisonous gas' is a property and not its formation.

40. **(3)** Ozone layer helps in stopping harmful UV radiations from the Sun to enter the earth's atmosphere. Excess amount of chlorofluorocarbons (usually from refrigeration appliances) in the atmosphere is found to endanger the ozone layer .

41. (4) **42.** (1) **43.** (3) **44.** (2)
45. (4) **46.** (4) **47.** (4)
48. (2) Disposable packaging materials are usually made from non-biodegradable substances.
49. (1) Disposable paper cups are biodegradable. Clay gets mixed with soil only after a long time.
50. (4) Food chain can have four levels for energy transfer of which decomposers is not a part.
51. (2) **52.** (3) **53.** (1) **54.** (1)
55. (3) A consumer does not depend on a single organism for fulfilling its energy requirements. It may eat the organism from a different food chain, thus interlinking them to form food webs.
56. (1) **57.** (2) **58.** (3)
59. (2) Plants are producers, ants eat plants, birds eat both plants and ants, snakes will eat the birds and the lion preys on them.
60. (2)

Exercise 2

1. (1) **2.** (2) **3.** (3) **4.** (4)
5. (1)
6. (1) Biodegradable wastes should be separated and kept in green colour bins for garbage collectors.
7. (1) CFCs (chloro-fluoro-carbons) causes depletion of ozone layer thereby allowing more UV-radiations to reach the earth.
8. (3) **9.** (3) **10.** (3)
11. (4) The abiotic components of the environment are the non-living factors like temperature, pressure, rainfall, soil, valley, mountain and plain etc. Ecosystem consists of a distinct biotic community and exchanging material between them.
12. (4) Energy flow is the key function in an ecosystem and it is unidirectional. Ten percent law states that during transfer of food energy, only 10% is stored at higher trophic level. The remaining 90% is lost during feeding, digestion and respiration.
13. (3)
14. (4) Ten percent law (Lindeman, 1942) states that during transfer of food energy from one trophic level to the next one, only ten percent is stored at higher trophic level. The remaining 90% is lost during feeding, digestion and respiration.
15. (1) Functioning of an ecosystem requires a flow of energy. Its movement is unidirectional from sun to plants, plants to animals, animals to animals, organic remains to decomposers and dissipation as heat.
16. (1)
17. (3) Biodegradable wastes are wastes which are broken down and disposed off naturally by saprophytes or decomposers.
18. (2) Non-biodegradable are wastes which cannot be broken down by decomposers because they do not have enzymes for the same.
19. (3) **20.** (1) **21.** (1) **22.** (1)
23. (4) Each step or division in food chain which is characterised by a particular method of obtaining food is called trophic level. A food chain usually possesses 3-4 trophic levels like producers *e.g.*, plants, herbivores *e.g.*, rabbit, grasshopper, carnivores *e.g.*, frog, fox and secondary carnivores *e.g.*, Hawk etc.
24. (1) **25.** (1)
26. (3) Tropical rain forests have disappeared mainly due to man's activities. Due to over population in countries like India, rain forests are cut to make place available for man to live and build houses. To build buildings and factories man has incessantly cut down trees. This has caused the depletion of rain forests.
27. (1) Animals blend with the surroundings or background to remain unnoticed for protection and aggression.
28. (1) **29.** (2) **30.** (1) **31.** (1)
32. (2) **33.** (4) **34.** (3) **35.** (3)