UNIT 6

Environmental Science

TEXTBOOK EVALUATION

I. Choose the correct answer.

1. All the factors of biosphere which affect the ability of organisms to survive and reproduce are called as _____.
   a. biological factors c. biotic factors
   b. abiotic factors d. physical factors

   Ans: b) abiotic factors

2. The ice sheets from the north and south poles and the icecaps on the mountains, get converted into water vapour through the process of_____.
   a. evaporation b. condensation
   c. sublimation d. infiltration

   Ans: c) sublimation

3. Free living soil bacteria such as Pseudomonas sp. are responsible for the _____ process in the nitrogen cycle.
   a. ammonification c. nitrification
   b. nitrogen fixation d. denitrification

   Ans: d) denitrification

4. The atmospheric carbon dioxide enters into the plants through the process of _____.
   a. photosynthesis c. respiration
   b. assimilation d. decomposition

   Ans: a) photosynthesis

5. Increased amount of _____ in the atmosphere, results in greenhouse effect and global warming
   a. carbon monoxide c. nitrogen dioxide
   b. sulphur dioxide d. carbon dioxide

   Ans: d) carbon dioxide

6. Which of the following is not an adaptation of hydrophytes?
   a. poorly developed root system
   b. reduced plant body
   c. water storing parenchymatous tissues
   d. finely divided submerged leaves

   Ans: c) water storing parenchymatous tissues

7. In some xerophytes, leaves are modified into spines as an adaptation _____.
   a. to reduce transpiration rate
   b. to store water
   c. to reduce consumption of water
   d. all of the above

   Ans: d) all of the above

8. Identify the incorrect statement with respect to adaptations of earthworm.
   a. Earthworm has a stream lined body with no antennae or fins.
   b. Each segment of earthworm has setae.
   c. Many earthworms become inactive in a process called hibernation, during winter season.
   d. Earthworms remain in its burrow during day time, to avoid sunlight.

   Ans: c) Many earthworms become inactive in a process called hibernation, during winter season.

9. Which of the following is one of the strategies to conserve water?
   a. Water recycling
   c. Increasing the number of bore wells
   b. Using large overhead water tanks
   d. Watering the plants using hose

Ans: a) Water recycling

10. Specific constituents such as nitrogen, phosphorus, suspended solids and heavy metals found in the wastewater are removed during _____ treatment of water recycling process.
    a. primary b. secondary
    c. tertiary d. none of the above

Ans: c) tertiary

II. Match the following.

Microorganism	Role Played
Nitrogen fixation	Nitrosomonas
Ammonification	Azotobacter
Nitrification	Pseudomonas species
Denitrification	Putrefying bacteria

Ans:

Microorganism	Role Played
Nitrogen fixation	Azotobacter
Ammonification	Putrefying bacteria
Nitrification	Nitrosomonas
Denitrification	Pseudomonas species

III. State whether the statements are true or false. Correct the false statements.

1. Nitrogen is a greenhouse gas.

Ans: False,Carbon dioxide is a greenhouse gas.

2. Poorly developed root is an adaptation of mesophytes.

Ans: False,Well developed root is an adaptation of mesophytes.

3. Bats are the only mammals that can fly.

Ans: True

4. Earthworms use the remarkable high frequency system called echoes.

Ans: False, Bats use the remarkable high frequency system called echoes.

5. Aestivation is an adaptation to overcome cold condition.

Ans: False, Aestivation is an adaptation to overcome hot or dry condition.

IV. Answer in brief.

1. What are the two factors of biosphere?

(i) Biotic or living factors which include plants, animals and all other living organisms.

(ii) Abiotic or non-living factors which include all factors like temperature, pressure,water, soil, air and sunlight which affect the ability of organisms to survive and reproduce.

2. According to you, which process of water cycle is adversely affected by human activities?

Major human activities affecting the water cycle on land are urbanisation, dumping of plastic waste on land and into water, polluting water bodies and deforestation.

3. How do human activities affect nitrogen cycle?

Burning fossil fuels, application of nitrogen-based fertilizers and other activities can increase the amount of biologically available nitrogen in an ecosystem. Nitrogen applied to agricultural fields enters rivers and marine systems. It alters the biodiversity, changes the food web structure and destroys the general habitat.

4. What is adaptation?

Any feature of an organism or its part that enables it to exist under conditions of its habitat is called adaptation.

5. What are the challenges faced by hydrophytes in their habitat?

Hydrophytes face certain challenges in their habitat. They are:

(i) Availability of more water than needed.

(ii) Water current may damage the plant body.

(iii) Water levels may change regularly.

(iv) Maintain buoyancy in water.

6. Identify the given plant. How does it adapt itself to its habitat?

Hydrilla

Submerged leaves are narrow or finely divided. e.g. *Hydrilla*.

7. Why is it important to conserve water?

- It creates more efficient use of the water resources.
- It ensures that we have enough usable water.
- It helps in decreasing water pollution.
- It helps in increasing energy saving.

8. List some of the ways in which you could save water in your home and school?

(i) Rain water harvesting.

(ii) Improved irrigation techniques.

(iii) Active use of traditional water harvesting structures.

(iv) Minimising domestic water consumption.

(v) Awareness on water conservation.

(vi) Construction of farm ponds.

(vii) Recycling of water.

9. What is grey water?

Grey water is reusable waste water from residential, commercial and industrial bathroom sinks, bath tub,shower drains and washing of clothes. Use of non-toxic and low sodium soap and personal care products is required to protect vegetation when reusing grey water for irrigation.

10. What are the uses of recycled water?

- Agriculture
- Landscape
- Public parks
- Golf course irrigation
- Cooling water for power plants and oil refineries
- Toilet flushing
- Dust control
- Construction activities

11. What is IUCN? What is the vision of IUCN?

IUCN is an international organization working in the field of nature conservation and sustainable use of natural resources.

Vision of IUCN

The vision of IUCN is 'A just world that values and conserves nature'.

V. Answer in detail.

1. Describe the processes involved in the cyclic flow of water between biotic and abiotic factors of biosphere?

Biosphere is the part of the earth where life exists. All resources of biosphere can be grouped into two major categories namely:

(i) Biotic or living factors which include plants, animals and all other living organisms.

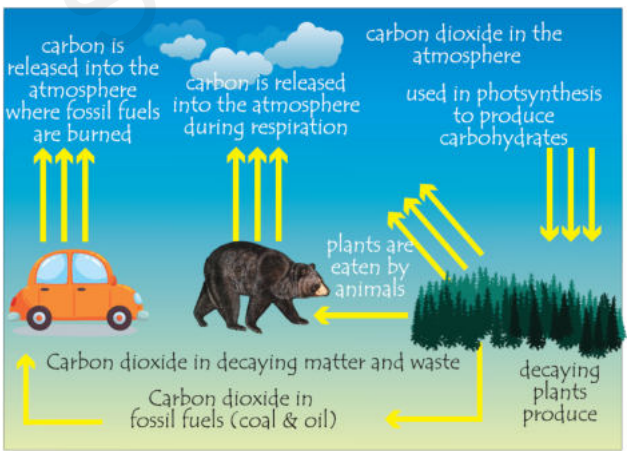
(ii) Abiotic or non-living factors which include all factors like temperature, pressure,

water, soil, air and sunlight which affect the ability of organisms to survive and reproduce. There is a constant interaction between biotic and abiotic components in the biosphere and that make the biosphere a dynamic and stable system. Cyclic flow of nutrients between non-living and living factors of the environment are termed as biogeochemical cycles. Some of the important biogeochemical cycles are:

1. Water cycle 2. Nitrogen cycle 3. Carbon cycle

2. Explain carbon cycle with the help of a flow chart? How can you reduce your contribution of carbon dioxide to the atmosphere?

Carbon occurs in various forms on earth. Charcoal, diamond and graphite are elemental forms of carbon. Combined forms of carbon include carbon monoxide, carbon dioxide and carbonate salts. All living organisms are made up of carbon containing molecules like proteins and nucleic acids. The atmospheric carbon dioxide enters into the plants through the process of photosynthesis to form carbohydrates. From plants, it is passed on to herbivores and carnivores. During respiration, plants and animals release carbon into atmosphere in the form of carbon dioxide. Carbon dioxide is also returned to the atmosphere through decomposition of dead organic matter, burning fossil fuels and volcanic activities.



Human impacts on carbon cycle

More carbon moves into the atmosphere due to burning of fossil fuels and deforestation. Most of the carbon in atmosphere is in the form of carbon dioxide. Carbon dioxide is a greenhouse gas. By increasing the amount of carbon dioxide, earth becomes warmer. This leads to greenhouse effect and global warming.

It is really interesting to know how nature renews itself. At the same time, it also reminds us of our responsibility to reduce and restrain our activities that will affect the natural processes. Living organisms also try to adjust themselves according to their habitat and changes in the ecosystems. The adaptations help them to survive better.

3. What are the conditions in a dry habitat to which plants develop adaptations? List out the adaptations of xerophytes?

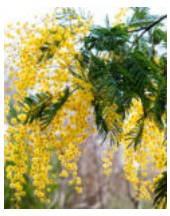
Plants that grow in dry habitat are called xerophytes. These plants develop special structural and physiological characteristics to meet the following conditions:

(i) To absorb as much water as they can get from the surroundings.

(ii) To retain water in their organs for very long time.

(iii) To reduce the transpiration rate.

(iv) To reduce consumption of water.



Acacia

Calotropis

Opuntia

Xerophytes

Adaptations of xerophytes

1. They have well developed roots. Roots grow very deep and reach the layers where water is available as in *Calotropis*.
2. They store water in succulent water storing parenchymatous tissues. e.g. *Opuntia*, *Aloe vera*.
3. They have small sized leaves with waxy coating. e.g. *Acacia*. In some plants, leaves are modified into spines. e.g. *Opuntia*.
4. Some of the xerophytes complete their life cycle within a very short period when sufficient moisture is available

4. How does a bat adapt itself to its habitat and also in response to temperature and light?

Bats are the only mammals that can fly. Mostly, bats live in caves. Caves provide them protection during the day from most predators and the temperature here is very stable. Apart from caves, bats also live in trees, hollowed logs and rock crevices. They are extremely important to humans as they reduce insect population and help to pollinate plants. Here, we will see the adaptations of bat in relation to their habitat.

Nocturnality

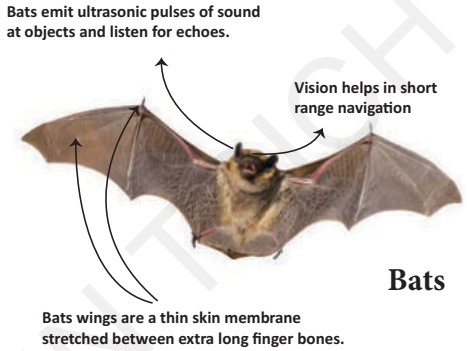
Bats are active at night. This is a useful adaptation for them, as flight requires a lot of energy during day. Their thin, black wing membrane (Patagium) may cause excessive heat absorption during the day. This may lead to dehydration.

Hibernation

Hibernation is a state of inactivity in which the body temperature drops with a lowered metabolic rate during winter. Bats are warm blooded animals but unlike other mammals, they let their internal temperature reduce when they are resting. They go to a state of decreased activity to conserve energy.

Echolocation

Bats are not blind. But to fly around and hunt for insects in the dark, they use a remarkable high-frequency system called echolocation. Bats give out high-frequency sounds (ultrasonic sounds). These sounds are reflected back from its prey and perceived by the ear. Bats use these echoes to locate and identify the prey.



Bats

5. What is water recycling? Explain the conventional wastewater recycling treatment?

Conventional waste water treatment consists of a combination of physical, chemical and biological processes which remove solids, organic matter and nutrients from waste water. The waste water treatment involves the following stages:

Primary treatment

Primary treatment involves temporary holding of the waste water in a tank. The heavy solids get settled at the bottom while oil, grease and lighter solids float over the surface. The settled and floating materials are removed. The remaining liquid may be sent for secondary treatment.

Secondary treatment

Secondary treatment is used to remove the biodegradable dissolved organic matter. This is performed in the presence of oxygen by aerobic microorganisms (Biological oxidation). The microorganisms must be separated from treated waste water by sedimentation. After separating the sediments of biological solids, the remaining liquid is discharged for tertiary treatment.

Tertiary treatment

Tertiary or advanced treatment is the final step of sewage treatment. It involves removal of inorganic constituents such as nitrogen, phosphorus and microorganisms. The fine colloidal particles in the sewage water are precipitated by adding chemical coagulants like alum or ferric sulphate.

VI.Give reason.

1. Roots grow very deep and reach the layers where water is available. Which type of plants develops the above adaptation? Why?

Xerophytes, They have well developed roots. Roots grow very deep and reach the layers where water is available as in *Calotropis*.

2. Why streamlined bodies and presence of setae is considered as adaptations of earthworm?

The earthworm has a cylindrical, elongated and segmented body. **This helps them to live in narrow burrows underground and for easy penetration into the soil.**

3. Echo location serves as an adaptation in bats. Justify the given statement.

Bats are not blind. But to fly around and hunt for insects in the dark, they use **a remarkable high-frequency system called echolocation**. Bats give out high-frequency sounds **(ultrasonic sounds).** These sounds are reflected back from its prey and perceived by the ear. Bats use these echoes to locate and identify the prey.

4. Farm ponds serve as an excellent water conservation strategy. Why is it impossible for all farmers to construct it in their fields?

- Farm ponds reduce water flow to other tanks and ponds situated in lower-lying areas.
- They occupy a large portion of farmer's lands.

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