Chapter: Ecosystem

Exercise

Question 1. Fill in the blanks.

(a) Plants are called as _____ because they fix carbon dioxide.

Answer: autotrophs

(b) In an ecosystem dominated by trees, the pyramid (of numbers) is _____ type.

Answer: inverted

(c) In aquatic ecosystems, the limiting factor for the productivity is _____.

Answer: light

(d) Common detritivores in our ecosystem are_____.

Answer: earthworms

(e) The major reservoir of carbon on earth is_____.

Answer: oceans

Question 2. Which one of the following has the largest population in a food chain?

(a) Producers

(b) Primary consumers

(c) Secondary consumers

(d) Decomposers

Answer: (d) Decomposers

Microorganisms such as bacteria and fungus are decomposers.
They are the most populous members of a food chain, obtaining nutrition through decomposing the re mnants of dead plants and animals.

Question 3. The second trophic level in a lake is

(a) Phytoplankton

(b) Zooplankton

(c) Benthos

(d) Fishes

Answer 3: (b) Zooplankton

Zooplankton is the major eaters of phytoplankton in aquatic food cycles.
As a result, they can be found in a lake's second trophic level.

Question 4. Secondary producers are

(a) Herbivores

(b) Producers

(c) Carnivores

(d) None of the above

Answer: (d) None of the above
Plants are the only ones who can generate anything. As a result, they are referred to as primary produc ers. In a food chain, there are no other producers.

Question 5. What is the percentage of photosynthetically active radiation (PAR), in the incident solar radiation.

(a) 100%

(b) 50%

(c) 1 - 5%

(d) 2 - 10%

Answer: (b) 50%

About half of all incident solar energy is converted into photosynthetically active radiation, or PAR.

Question 6. Distinguish between

(a) Grazing food chain and detritus food chain

(b) Production and decomposition

(c) Upright and inverted pyramid

(d) Food chain and Food web

(e) Litter and detritus

(f) Primary and secondary productivity

Answer:

(a) Grazing food chain and detritus food chain

Grazing food chain	Detritus food chain
1.Energy comes from the Sun in this food chai n.	1.Organic matter (or detritus) generated in trophic levels of the grazing food chain provides energy to this food chain.
2.It all starts with the producers, who are found at the first trophic level. Herbivores devour the plant biomass, which is later consumed by a variety of carnivores.	2.It starts with debris, such as animal carcasses or fallen leaves, which are subsequently consumed by decomposers or detritivores. Predators eat these detritivores, which are then ea ten by their predators.

3.This food chain is typically rather long.	3.In comparison to the grazing food chain, it is generally smaller.

(b) Production and decomposition

Production	Decomposition
1.It is the pace at which producers generate organic stuff (food).	1.It is the process of decomposing complex organic matter or biomass from the bodies of dead plants and animals using decomposers to produce organic raw materials like CO_2, H_2O and other nutrients.
2.It is determined by the producers' photosynthetic capability.	2. It occurs with the assistance of decomposers.
3.Plants require sunlight for basic production.	3. Decomposers do not require sunlight to break down.

(c) Upright and inverted pyramid

Upright pyramid	Inverted pyramid
1. The energy pyramid is always erect.	1.The biomass pyramid and the number pyramid may both be inverted.
2.The quantity and biomass of species in the producer level of an ecosystem are the highest in the upright pyramid, and they continue to decrease at each trophic level in the food chain.	2.The quantity and biomass of species at the producer level of an ecosystem are the lowest in an inverted pyramid, and they continue to increase at each tropic level.

(d) Food chain and Food web

Food chain	Food web
1. It consists of a single line of organisms.	1.It is made up of several interwoven food systems.
2.Members at higher trophic levels eat just one kind of creature.	2.One organism has a number of different food sources.

(e) Litter and detritus

Litter	Detritus
1.Litter is made up of a variety of wastes that are created above ground.	1.The leftovers of deceased plants and animals make up detritus.
2. Both biodegradable and non-biodegradable materials can be found in litter.	2.Detritus is made up entirely of biodegradable materials.

(f) Primary and secondary productivity

Primary productivity	Secondary productivity
It is defined as the quantity of organic matter generated per unit area by producers during a certain time period.	It is defined as the pace at which consumers produce organic matter over a period of time.

Question 7. Describe the components of an ecosystem.

Answer: An ecosystem is an interacting unit that contains both the biological community and the non-living elements of a given region. The living and non-living components of an ecosystem interact and work together as a unit, as evidenced by activities such as nutrient cycling, energy flow, decomposition, and production. Ponds, woodlands, meadows, and other habitats are only a few examples. An ecosystem is made up of two parts:

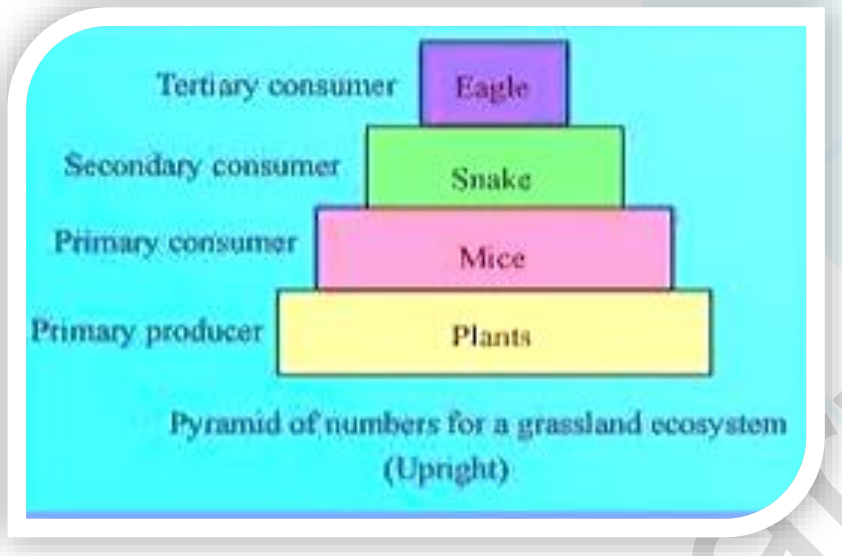
- Biotic component: A biotic component is a living component of an ecosystem that includes pr oducers, consumers, decomposers, and other biotic variables. Plants and algae are among the producers. They contain chlorophyll pigment, which aids in the photosynthesis process in the presence of light. As a result, they're also known as converters or transducers. Consumers, als o known as heterotrophs, are creatures that rely on producers for food either directly (primary consumers) or indirectly (secondary and tertiary consumers).
  Microorganisms such as bacteria and fungus are decomposers. They are the most populous m embers of a food chain, obtaining nutrition through decomposing the remnants of dead plants and animals.

- Abiotic components: Light, temperature, water, soil, air, inorganic nutrients, and other non-living components of an ecosystem are referred to as abiotic components.

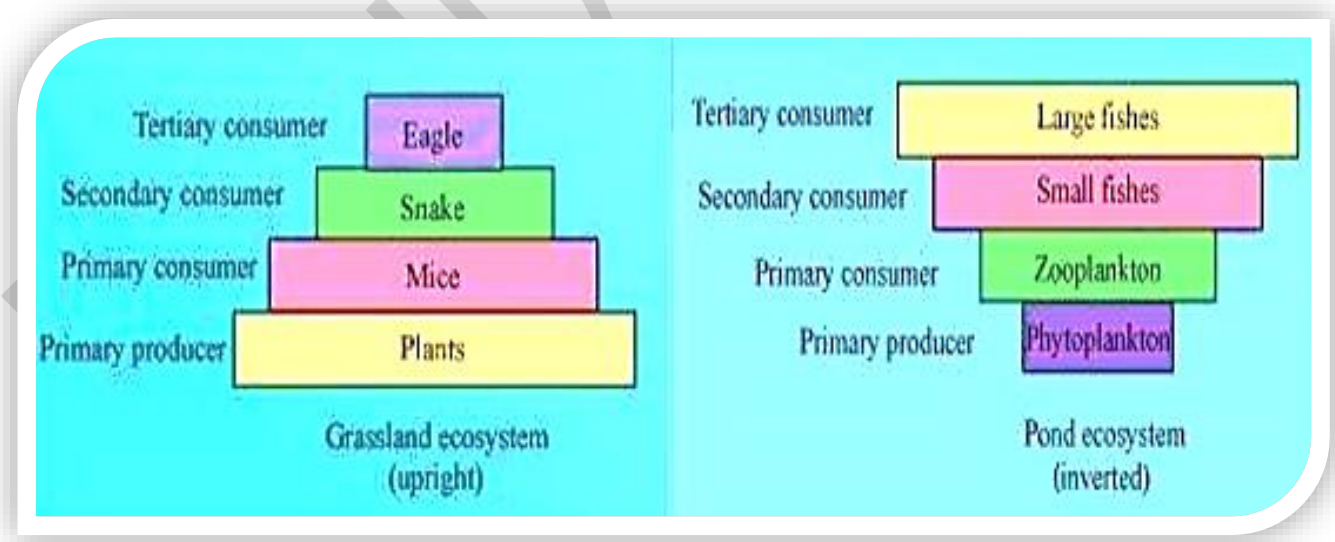
Question 8. Define ecological pyramids and describe with examples, pyramids of number and biomass.

Answer:
A graphical depiction of several ecological factors such as the number of people present at each trophi c level, the quantity of energy present at each trophic level, or the biomass present at each trophic leve l is called an ecological pyramid. The bottom of an ecological pyramid represents producers, while the top symbolises the ecosystem's highest level consumers. Pyramids are divided into three categories:

- Pyramid of numbers:
  It's a graphical representation of the number of people in each trophic level of an ecosystem's food chain. Depending on the number of producers, the numbers pyramid might be upright or inverted. In a grassland environment, for example, the number pyramid is vertical. The numbe r of producers (plants) is followed by the number of herbivores (mice), who are followed by s econdary consumers (snakes) and tertiary carnivores in this sort of food chain (eagles). As a r esult, the number of individuals present at the producer level will be the greatest, while the nu mber of persons present at the top carnivore level will be the smallest. In a parasitic feeding chain, on the other hand, the number pyramid is reversed. A single tree (producer) offers food to multiple fruit-eating birds, which in turn feed several bug species in this sort of food chain.



- Pyramid of energy:
- Pyramid of biomass: A graphical depiction of the total quantity of living matter present at each trophic level of an ecosystem is a biomass pyramid. It might be inverted or upright. Because the quantity of biomass present at the producer level is more than at the top carnivore level, it is vertical in grasslands and forest environments. In a pond environment, the biomass pyramid is inverted because fish biomass significantly outnumbers zooplankton biomass (upon which they feed).



Question 9. What is primary productivity? Give brief description of factors that affect primary productivity.

Answer:
It is defined as the quantity of organic matter or biomass generated per unit area by producers during a certain time period. The primary productivity of an ecosystem is influenced by a range of elements s uch as light, temperature, water, precipitation, and so on. It is also dependent on the availability of nu trients and the presence of plants capable of photosynthesis.

Question 10. Define decomposition and describe the processes and products of decomposition.

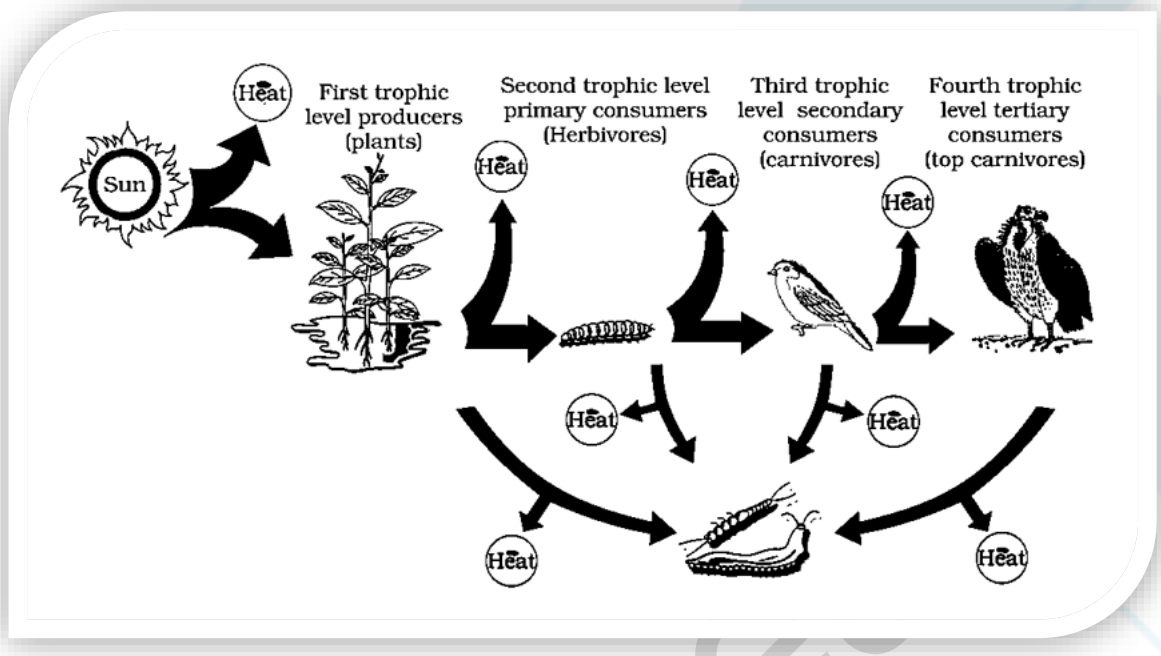
Answer:
Decomposition is the breakdown of complex organic matter or biomass from the bodies of dead plants and animals into inorganic basic materials such as carbon dioxide, water, and other nutrients with the aid of decomposers. The following are the numerous breakdown processes:

- Fragmentation:
  It is the initial stage in the breakdown process. It involves the action of detritivores such as ea rthworms breaking down debris into smaller bits.
- Leaching: It's a process in which water soluble nutrients get trapped as inaccessible salts in the soil layers.
- Catabolism: It is a process in which bacteria and fungi break down trash into smaller bits usin g different enzymes.
- Humification: The next phase is humification, which results in the development of humus, a dark-colored colloidal material that functions as a nutrient store for plants.
- Mineralization: The action of bacteria further degrades the humus, resulting in the release of i norganic nutrients into the soil. Mineralization is the process of extracting inorganic nutrients from humus. Humus is a dark-colored, nutrient-rich material that results from decomposition. Finally, humus degrades in the soil, releasing inorganic raw materials like as CO_2, water, and other nutrients.

Question 11. Give an account of energy flow in an ecosystem.

Answer: The Sun provides energy to an environment. Solar rays are absorbed by the Earth's surface after passing through the atmosphere. These rays assist plants in completing the photosynthesis process. They also aid in maintaining the Earth's temperature, which is necessary for the survival of living species. The Earth's surface reflects some of the sun's rays. During photosynthesis, only 2-10% of solar energy is taken by green plants (producers) and transformed into food.

Gross primary productivity refers to the pace at which plants create biomass during photosynthesis. Only 10% of the stored energy from producers is transmitted to herbivores when these green plants are devoured by herbivores.
Plants use the remaining 90% of this energy for respiration, development, and reproduction, among other things. Similarly, herbivores send just ten percent of their energy to predators. This is mainly referred to as the ten percent rule.

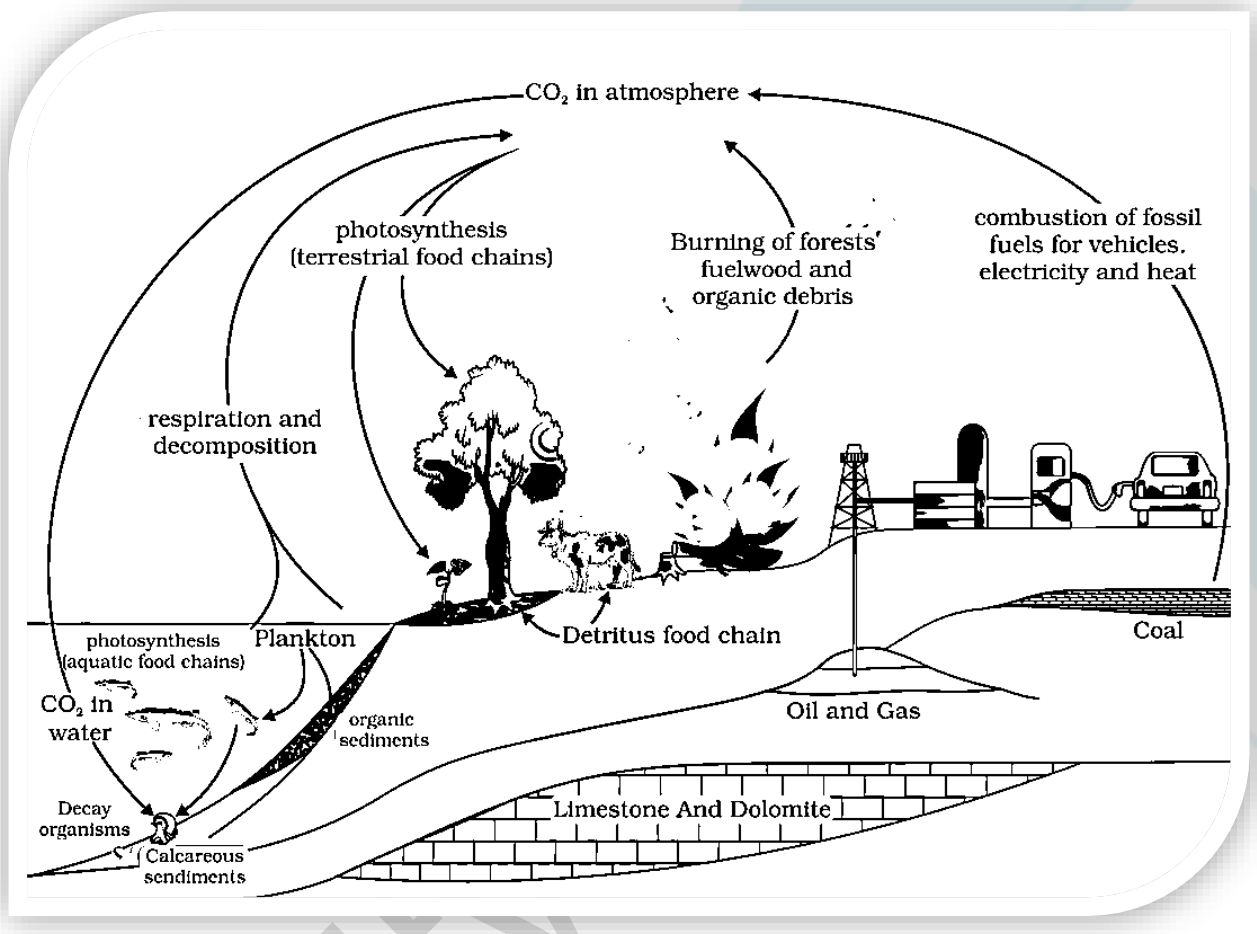


Question 12. Write important features of a sedimentary cycle in an ecosystem.

Answer: The reservoirs for sedimentary cycles are found in the Earth's crust or rocks. The Earth's sediments are rich in nutrient elements. Sedimentary cycles exist for elements including sulphur, phosphorus, potassium, and calcium. Sedimentary cycles take a long time. They are regarded less ideal cycles since they take a lengthy time to complete their circulation. This is because during recycling, nutritional elements may stay stuck in the reservoir pool, consequently requiring a very lengthy time to get out and resume circulation. As a result, it is frequently out of circulation for an extended period of time.

Question 13. Outline salient features of carbon cycling in an ecosystem.

Answer: The carbon cycle is a significant gaseous cycle with an atmospheric reservoir pool. Carbon is a key body ingredient in all living creatures. Carbon is a basic element that may be found in all living things. Carbon is found in all biomolecules, including carbohydrates, lipids, and proteins, which are necessary for life activities. Photosynthesis is a vital mechanism that incorporates carbon into living organisms. Photosynthesis produces the carbon molecule 'glucose' from sunlight and carbon dioxide in the atmosphere. Other living creatures make use of this glucose molecule. As a result, carbon from the atmosphere is absorbed by living organisms. To complete the cycle, this absorbed carbon dioxide must now be recycled back into the atmosphere. Carbon gets recycled back into the environment in the form of carbon dioxide gas through a variety of mechanisms. Respiration is the breakdown of glucose molecules into carbon dioxide gas. Decomposition also releases carbon dioxide into the atmosphere through the dead corpses of plants and animals. Other important sources of carbon dioxide include fuel combustion, industrialization, deforestation, volcanic eruptions, and forest fires.


CO_2 in atmosphere
photosynthesis (terrestrial food chains)
Burning of forests' fuelwood and organic debris
combustion of fossil fuels for vehicles, electricity and heat
respiration and decomposition
photosynthesis (aquatic food chains)
Plankton
Detritus food chain
Coal
CO_2 in water
organic sediments
Oil and Gas
Decay organisms
Limestone And Dolomite
Calcareous sendiments