

Class: 12
Subject: Biology
Topic: Ecosystem
No. of Questions: 25

Q1. What is primary productivity? Give brief description of factors that affect primary productivity?

Sol. Primary productivity refers to the rate of production of biomass or organic matter per unit area over a time period by the producers in an ecosystem.

Various factors which affect primary productivity include light, temperature, water, nutrients etc. In deserts, sunlight is abundant but water is scarce or nutrients are lacking. Therefore, in such areas, water and nutrient supply become the limiting factor. Productivity increases from polar regions towards the tropic because of the increasing sunlight and temperature.

Q2. Define decomposition and describe the processes and products of decomposition.

Sol. Decomposition is the process of breaking down a substance into its constituent parts. It is a complex, enzymatic process that involves stepwise degradation of detritus.

It involves three steps : fragmentation of detritus, leaching and catabolism involving humification and mineralization. Humification results in formation of humus in soil. Mineralisation results in the release of inorganic substances (CO_2 , H_2O) and temperature.

Q3. Write important features of sedimentary cycle in an ecosystem.

Sol. In the sedimentary cycles, the reservoir for the nutrient elements is in the sediments of the earth. Elements such as phosphorus, sulphur, potassium and calcium have sedimentary cycles. These cycles are slow and less perfect systems in that the elements may get locked in the reservoir pool and go out of circulation for long periods.

Q4. State what does 'standing crop' of a trophic level represent.

Sol. There is unidirectional movement of energy towards the higher trophic levels and each level has a certain mass of living material at a particular time called as the standing crop. It represents values for dry biomass (standing crop).

Q5. What is blubber?

Sol. Blubber is a thick layer of subcutaneous fat in whales and seals that acts as a thermal insulation.

Q6. What are coral reefs?

Sol. Rocks formed in the coastal seas by calcareous secretions of cnidarian polyps.

Q7. What is nonbiological nitrogen fixation?

Sol. Conversion of atmospheric N_2 into nitrous oxide (NO_2) by electrical energy of lightning and by natural ionizing radiation is called nonbiological N_2 fixation.

Q8. Which regions of the biosphere lack life?

Sol. Frozen mountain peaks, poles, extremely dry regions, live volcanoes and toxic sea basin.

Q9. List the processes involved in nitrogen cycle.

Sol. Nitrate assimilation, ammonification, nitrification, denitrification, biological nitrogen fixation and non-biological nitrogen fixation.

Q10. Industries cause rise as well as fall in the temperature of biosphere. Explain.

Sol. Industries add CO_2 and particulate matter to the air. The CO_2 acts as a greenhouse gas and increases air temperature, whereas the particulate matter decreases amount of sunlight reaching the earth and this reduces earth's temperature.

Q11. Differentiate between a detritivore and a decompose giving an example of each.

Sol. Detritivore breaks down detritus into smaller particles and this process is called fragmentation. Example is earthworm.

Decomposer breaks down complex organic matter into inorganic substances and the process is called decomposition. Example is bacteria.

Q12. State the difference between the first trophic levels of detritus food chain and grazing food chain.

Sol. In grazing food chains, green plants (producers) constitute the first trophic level.

In detritus food chain, decomposers or detritivores constitute the first trophic level. They feed on detritus (dead decaying organic matter).

Q13. Name the pioneer and the climax species in a water body. Mention the changes observed in the biomass and the biodiversity of the successive seral communities developing in the water body.

Sol.

(i) Pioneer species in a water body are autotrophic phytoplanktons such as diatoms, unicellular or filamentous algae, green flagellates and cyanobacteria.
Climax species in a water body are trees.

(ii) Biomass and the biodiversity goes on increasing in the successive seral communities developing in the waer body.

Q14. Climax stage is achieved quickly in secondary succession as compared to primary succession? Why?

Sol. It is so because the substratum has rich organic matter, therefore, secondary succession achieves climax stage quickly.

Q15. "It is possible that a species may occupy more than one trophic level in the same ecosystem at the same time." Explain with the help of one example.

Sol. The trophic level represents a functional level, not a species as such. A given species may occupy more than one trophic level in the same ecosystem at the same time; for example, a sparrow is a primary consumer when it eats seeds, fruits, peas, and a secondary consumer when it eats insects and worms.

Q16. Define and ecosystem. Give a few instances of an ecosystem.

Sol. An ecosystem may be defined as a structural and functional unit of the biosphere, comprising living organisms and their non-living environment that interact by meSol. of food chains and chemical cycles resulting in energy flow, biotic diversity and material cycling to form a stable, self-supporting system.

Few instances of an ecosystem are a pond, a lake, a grassland, a desert, a village, a forest etc.

Q17. Name the pioneer species on a bare rock. How do they help in establishing the next type of vegetation? Mention the type of climax community that will ultimately get established.

Sol.

- (i) Lichens are the pioneer species on a bare rock. They are resistant to desiccation and temperature extremes. They produce organic acids which corrode the rock surface. This produces depression and release minerals which facilitate their further growth. The dead lichens and organic matter form the soil. The next community develops on this meager soil formed.
- (ii) The climax community will be trees.

Q18. Explain why ecological succession will be faster in a forest devastated by fire than on a bare rock? Also, compare succession in case of an abandoned land after floods with that on a bare rock?

Sol. If succession occurs in an area devoid of life, it is termed as primary succession. On the other hand, if succession occurs in an area where natural or man made causes have resulted in destruction but still has organic matter, then it is termed as secondary succession.

Primary succession on a bare rock is very slow as establishment of new communities is a slow process and formation of soil takes several hundred years. On the other hand, in areas where natural biotic communities have been destroyed, e.g., forests after fire or abandoned land after flood, succession is faster. It is so because such areas still have soil and sediment rich in organic matter.

Q19. Why are reducers or decomposers considered crucial and essential components of an ecosystem? Explain.

Sol. Sun is the endless source of energy, but the chemical materials of the environment are exhaustible. The producers fix solar energy into the chemical energy of organic compounds by utilizing inorganic substances (i.e., CO_2 and water). This stored energy is passed to consumer by repeated eating and being eaten. Decomposers act on dead decaying organic matter and return the locked inorganic substances back to the environment for their reuse by producers. Without this, all life will ultimately cease to exist and earth will be full of dead organisms and waste organic substances.

Q20. One day, Ganesh asked his father why is government so much worried about decreasing population of tigers? His father replied that it is important to save the tigers as they are at the end of food chains in forest ecosystem and play a role to keep the biotic components in ecosystem in balance.

Read the above passage and Sol.wer the following questions:

- (i) What is a food chain?
- (ii) What is an ecosystem?
- (iii) What value is displayed by Ganesh's father?

Sol.

- (i) The sequential inter-linking of organisms involving the transfer of food energy from the producers, through a series of organisms with repeated eating and being eaten is referred to as the food chain.
- (ii) It is defined as a structural and functional unit of the biosphere, comprising living organisms and their non living environment that interact by means of food chains and chemical cycles resulting in energy flow, biotic diversity and material cycling to form a stable, self-supporting system.
- (iii) Ganesh's father wanted to enhance his son's interest in environmental science.

Q21. What is true of ecosystem?

- a) Primary consumers are least dependent upon producers
- b) Primary consumers out number producers
- c) Producers are more than primary consumers
- d) Secondary consumers are the largest and most powerful

Sol.. (c)

Q22. In an ecosystem, which one shows one way passage

- a) Nitrogen
- b) Carbon
- c) Potassium
- d) Free energy

Sol.. (d)

- Q23. Upper part of sea/ aquatic ecosystem contains
- a) Plankton
 - b) Nekton
 - c) Benthos
 - d) Plankton and Nekton

Sol.. (a)

- Q24. Pyramid of numbers in a grassland/ tree ecosystem is pyramid of numbers in grass land
- a) Always inverted
 - b) Always upright
 - c) Both a) and b)
 - d) Spindle shaped

Sol.. (b)

- Q25. Food chain in which microorganisms breakdown the food formed by primary producers is
- a) Parasitic food chain
 - b) Detritus food chain
 - c) Consumer food chain
 - d) Predator food chain

Sol.. (b)