Chapter

36 Ecosystem

TYPE A : MULTIPLE CHOICE QUESTIONS

1. The food chain in which microbes breakdown energy rich compounds synthesized by producers is called ***[1999]***
(a) ecosystem
(b) parasitic food chain
(c) detritus level chain
(d) predator food chain

2. 10 % law of energy transfer was given by
(a) Lindemann (b) Tansley ***[2000]***
(c) Stanley (d) Darwin

3. Food chain starts with ***[2000]***
(a) autotrophs (b) herbivores
(c) carnivores (d) decomposers

4. Flora and fauna in lake or ponds is ***[2000]***
(a) lentic biota (b) lotic biota
(c) abiotic biota (d) field layer

5. The enzyme responsible for the reduction of molecular nitrogen to the level of ammonia in the leguminous root nodule is ***[2000]***
(a) nitrogenase (b) nitrate reductase
(c) nitrite reductase (d) ammoneases

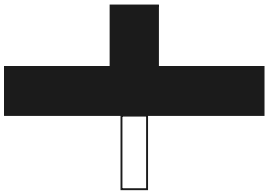
6. The role of bacteria in carbon cycle is ***[2000]***
(a) photosynthesis
(b) chemosynthesis
(c) decomposition of organic compounds
(d) evolution of O_2

7. Trophic levels are formed by : ***[2001]***
(a) plants
(b) animals
(c) organisms linked in food chain
(d) carnivores

8. Desert can be converted into green land by planting ***[2001]***
(a) oxylophytes (b) psammophytes
(c) halophytes (d) trees

9. Mr. X is eating curd/yoghurt. For this food intake in a food chain Mr. X should be considered as occupying ***[2003]***
(a) first trophic level
(b) second trophic level
(c) third trophic level
(d) fourth trophic level

10. Given below is one of the types of ecological pyramids. This type represents ***[2005]***

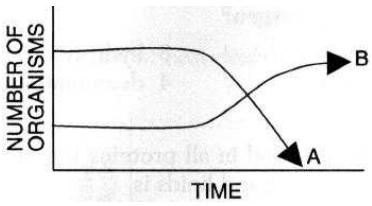


(a) pyramid of numbers in a grassland
(b) pyramid of biomass in a fallow land
(c) pyramid of biomass in a lake
(d) energy pyramid in a spring

11. The function of leghaemoglobin during biological nitrogen fixation in root nodules of legumes is to ***[2006]***
(a) convert atmospheric N_2 to NH_3
(b) convert ammonia to nitrite
(c) transport oxygen for activity of nitrogenase
(d) protect nitrogenase from oxygen

12. An ecosystem, such as an aquarium, is self-sustaining if it involves the interaction between organisms, a flow of energy, and the presence of ***[2009]***
(a) equal numbers of plants and animals
(b) more animals than plants
(c) materials cycles
(d) pioneer organisms

13. The graph below shows the changes in two populations of herbivores in a grassy field. A possible reason for these changes is that ***[2009]***



(a) all of the plant populations in this habitat decreased.
(b) population B competed more successfully for food than population A did.
(c) population A produced more offspring than population B did.
(d) population A consumed the members of population B.

14. A scorpion stalks, kills, and then eats a spider. Based on its behavior, which ecological terms describe the scorpion? ***[2009]***
(a) producer, herbivore, decomposer
(b) producer, carnivore, heterotroph
(c) predator, carnivore, consumer
(d) predator, autotroph, herbivore

15. In the vast marine ecosystem, certain sea develop red colouration. This red colour is due to the presence of large population of which one of the following organisms? ***[2009]***
(a) *Trichodesmium erythrium*
(b) *Physarium*
(c) Dinoflagellates
(d) Diatoms and members of red algae

16. The xerophytic plants conserve water by storing it in ***[2009]***
(a) intercellular spaces
(b) normal parenchymatous cells
(c) intercellular spaces and parenchymatous cells
(d) parenchymatous cells specialized for this purpose

17. Most of the desert plants bloom during night time because ***[2010]***
(a) their blooming is controlled by low temperature.
(b) they are sensitive to the phases of moon.
(c) the desert insects eat away flowers during day time.
(d) the desert insects are active during night time.

18. Whale is ***[2012]***
(a) Primary producer
(b) Carnivorous, secondary consumer
(c) A decomposer
(d) Herbivorous

19. Which one of the following is not a function of an ecosystem? ***[2013]***
(a) Energy flow (b) Decomposition
(c) Productivity (d) Stratification

20. How much portion of the Photosynthetically Active Radiation (PAR) is captured by the plants? ***[2016]***
(a) 5 – 10% (b) 7 – 10%
(c) 8 – 10% (d) 2 – 10%

21. Arrange the following ecosystems in increasing order of mean NPP (Tonnes / ha / year)
A. Tropical deciduous forest
B. Temperate coniferous forest
C. Tropical rain forest
D. Temperate deciduous forest ***[2017]***
(a) B < A < D < C
(b) D < B < A < C
(c) A < C < D < B
(d) B < D < A < C

TYPE B : ASSERTION REASON QUESTIONS

Directions for (Q. 22) : These questions consist of two statements, each printed as Assertion and Reason. While answering these questions, you are required to choose any one of the following five responses.

(a) If both Assertion and Reason are correct and the Reason is a correct explanation of the Assertion.
(b) If both Assertion and Reason are correct but Reason is not a correct explanation of the Assertion.
(c) If the Assertion is correct but Reason is incorrect.
(d) If both the Assertion and Reason are incorrect.
(e) If the Assertion is incorrect but the Reason is correct.

22. **Assertion:** Insectivorous habitat of plants is to cope up O_2 deficiency.

Reason: Insectivorous plants are partly autotrophic and partly heterotrophic. ***[1998]***

Directions for (Qs. 23-28) : Each of these questions contains an Assertion followed by Reason. Read them carefully and answer the question on the basis of following options. You have to select the one that best describes the two statements.

(a) If both Assertion and Reason are correct and Reason is the correct explanation of Assertion.

(b) If both Assertion and Reason are correct, but Reason is not the correct explanation of Assertion.

(c) If Assertion is correct but Reason is incorrect.

(d) If both the Assertion and Reason are incorrect.

23. **Assertion :** A network of food chains existing together in an ecosystem is known as food web.

Reason : An animal like kite cannot be a part of a food web. ***[2006, 2008, 2011]***

24. **Assertion :** Pyramid of energy may be upright or inverted. ***[2011]***

Reason: Only 20% of energy goes to next trophic level.

25. **Assertion :** Biotic community has higher position than population in ecological hierarchy.

Reason : Population of similar individuals remains isolated in the community. ***[2012]***

26. **Assertion :** Net primary productivity is gross primary productivity minus respiration.

Reason : Secondary productivity is produced by heterotrophs. ***[2013]***

27. **Assertion :** Net primary productivity is gross primary productivity minus respiration.

Reason : Secondary productivity is produced by heterotrophs. ***[2016]***

28. **Assertion :** In a food chain, members of successive higher levels are fewer in number.

Reason : Number of organisms at any trophic level depends upon the availability of organisms which serve as food at the lower level.

[2003, 2017]

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Type A : Multiple Choice Questions

1. (c) In nature, detritus food chains are indispensable as the dead organic matter of grazing food chains is acted upon by the detritivores (bacteria, protozoa, nematodes) to recycle the inorganic elements into the ecosystem.

2. (a) 10 % law of energy transfer (pyramid of energy) was given by Lindemann.

In this, only 10% of total energy received by one trophic level is transferred to next trophic level.

3. (a) All trophic levels in an ecosystem are connected by transfer of food as energy. The transfer of food and its contained energy from one trophic level to the next trophic level is called food chain.

Food chain always starts with producers (autotrophs) $\rightarrow$ Herbivores $\rightarrow$ Carnivorous $\rightarrow$ Detrivores are placed at the top of the food chain.

4. (a) Lentic relates to still waters such as lakes and ponds. Hence, the flora and fauna constitue the lentic biota.

5. (d) The enzyme responsible for the reduction of nitrogen to ammonia is ammoneases and the process is ammonification. *e.g.* actinomycetes, *Bacillus ramosus, B. vulgaris etc.*

6. (c) The excretory wastes of living organisms have accumulated carbon compounds and they are decomposed after their death by micro-organisms in the soil to release CO_2 back into the environment for its recycling.

7. (c) The producers and consumers in ecosystem are arranged into several feeding groups/levels called trophic levels.

8. (b) Psammophytes are those plants that can grow in desert and mainly in sandy soil. Hence, psammophytes can be used to convert desert into a green land.

9. (c) Producers occupy first trophic level, primary consumers *i.e.* herbivores (cow produce milk formating curd) are placed at second trophic level and Mr. X will occupy third place (curd eater).

10. (c) The given figure shows the pyramid of biomass in a lake. An ecological pyramid of biomass shows the relationship between biomass and trophic level by quantifying the amount of biomass present at each trophic level of an ecological community at a particular moment in time.

11. (d) Leghaemoglobin is an oxygen scavanger. It combines with oxygen and protects nitrogenase which catalyses the fixation of nitrogen under anerobic conditions.

12. (c) If a ecosystem is to be self-sustaining, materials such as oxygen, carbon dioxide, water and nitrogen must to recycle between the organisms.

13. (b) If population B increased while population A decreased, these organisms were probably in competition for the same food (grass) and population B was better adapted. Hence, population A is competitively being excluded from the population.

14. (c) Because the scorpion stalks, kills and eats its food, it is a predator. Because it eats a spider it is a carnivore. Because it ingests food it is a consumer. A producer is an autotroph as it is an organism that makes its own food from inorganic substances. A decomposer breaks down dead matter and a herbivore eats only plants.

15. (a) *Trichodesmium erythreum* is a cyanobacteria (blue green alga). Although a blue green alga, it possesses a pigment, phycoerythrin, which is red in colour and imparts red colour to the water of the sea in which it is found, hence named Red Sea.

16. (d) The xerophytic plants conserve water by storing it in parenchymatous cells specialized for this purpose. Xerophytes plants are specially adapted to succeed in an arid climate. They are typically able to withstand long periods of drought and the drying effects of desert winds. Some plants have adapted to arid lands by developing the ability to store water.

17. (d) In desert condition, most of the activity of the plants and animals happens during night because of very high temperature in day time. As a result the desert insects make themselves active and pollinate the flowers at night. To attract the insects, most of the desert plants bloom during night.

18. (b) Whale is carnivorous and feeds on primary consumer and occupies the third trophic level of the ecosystem.

19. (d) Four important functional aspects of the ecosystem are
(i) Productivity
(ii) Decomposition,
(iii) Energy flow and
(iv) Nutrient cycling.

20. (d) The main source of energy for an ecosystem is the radiant energy or light energy derived from the sun. 50% of the total solar radiation that falls on earth is Photosynthetically Active Radiation (PAR).
The light energy is converted into chemical energy in the form of sugar by photosynthesis.
$6H_2O + 6CO_2 + Light \rightarrow 6C_6H_{12}O_6 + 6O_2$
Plants utilize 2-10% of PAR in photosynthesis.

21. (d) Net primary productivity (NPP) is the biomass or storage of energy by green plants. It is equal to the gross primary productivity minus loss due to respiration. The productivity generally increases from polar regions toward the tropics, because of the increasing sunlight and temperature.

Type B : Assertion Reason Questions

22. (e) Insectivorous plants are those plants which capture and digest live prey (normally insects) to obtain nitrogen compounds that are lacking in its usual marshy habitat. These plants are partly autotrophic and partly heterotrophic.

23. (c) In the food web, different food chains are interconnected. Each chain is interconnected and consists of different trophic levels i.e. producers, consumers and detrivorous. So, kite can also be a part of food web.

24. (d) Energy flow in the ecosystem is a unidirectional manner. There is a decline in the amount of energy passing from one trophic level to the next. Thus the pyramid of energy is always upright. According to Lindemann, only 10% of energy goes to next trophic level.

25. (c) The organisms of all the species that live in a particular area and interact in various ways with one another form biotic community. Biotic community is a grouping that is higher than population in ecological hierarchy. It is an assemblage of all the populations of different organisms occurring in an area. The different populations of a community do not remain isolated. They show interactions and inter-dependence.

26. (b) Net primary productivity is the rate of organic matter built up or stored by producers in their bodies per unit time and area. Net productivity is equal to gross primary productivity minus loss due to respiration and other reasons. Rate of increase in energy containing organic matter or biomass by heterotrophs or consumers per unit time and area is known as secondary productivity.

27. (b) Net primary productivity is the rate of organic matter build up or stored by producers in their bodies per unit time and area. Net productivity is equal to gross primary productivity minus loss due to respiration and other reasons. Rate of increase in energy containing organic matter or biomass by heterotrophs or consumers per unit time and area is known as secondary productivity.

28. (d) When food is made available, automatically the next higher level of organism in the hierarchy should increase. This is because when the forest cover got depleted it led to the increase in the number of endangered species. If the deer population is more, it automatically leads to an increase in the tiger population.