

(3) ✓ **What is Trophic level?**
 Ans. A trophic level is the step at which the organism obtains its food in the chain.

(4) ✓ **What is Pyramid of energy?**
 Ans. The pattern of energy exchange in an ecosystem is called a 'Pyramid of energy'.

(5) ✓ **What is Bio-geo-chemical cycle?**
 Ans. The cyclical flow of nutrients within an ecosystem is called bio-geo-chemical cycle.

(6) ✓ **What is Carbon cycle?**
 Ans. The circulation and recycling of carbon from the atmosphere to living organisms and after their death back to the atmosphere is called the carbon cycle.

(7) ✓ **What is Oxygen cycle?**
 Ans. The circulation and recycling of oxygen within the biosphere is called as oxygen cycle.

(8) ✓ **What is Nitrogen cycle?**
 Ans. The circulation and recycling of nitrogen gas into the form of different compounds through various biotic and abiotic processes in nature is called the nitrogen cycle.

(9) ✓ **What is Nitrogen fixation?**
 Ans. The process of conversion of free nitrogen gas of the atmosphere into nitrogen compounds is called of nitrogen fixation.

Q.2. (A) Give scientific reasons:

✓(1) **Energy flow through an ecosystem is 'one way'.**

- Ans.
- (i) The Sun is the most important source of energy in any ecosystem.
 - (ii) Green plants of the ecosystem store some amount of solar energy in the form of food.

Q.2. (B) 1 Distinguish between:

(1) ✓ **Gaseous Cycle and Sedimentary Cycle.**

Gaseous Cycle	Sedimentary Cycle
(i) It is an accumulation of the main abiotic gaseous nutrient materials found in the earth's atmosphere.	(i) It is an accumulation of the main abiotic nutrient materials found in the soil, sediment and sedimentary rocks, etc. of the earth.
(ii) It includes nitrogen, oxygen, carbon dioxide, water vapour etc.	(ii) It includes soil components like iron, calcium, phosphorus etc.

- (iii) Before reaching the decomposers, this energy is passed on from one trophic level to the next.
 - (iv) Decomposers dissipate some amount of energy in the form of heat.
 - (v) However, no part of the energy ever returns to the Sun. Hence, energy flow through an ecosystem is 'one way'.
- * (2) **Equilibrium is necessary in the various bio-geo-chemical cycles.**

Ans.

- (i) The cyclic flow of nutrients within an ecosystem is called bio-geo-chemical cycles.
- (ii) Nutrients, necessary for the growth of organisms are continuously transferred from abiotic to biotic factors and biotic to abiotic factors within an ecosystem.
- (iii) Any imbalance in the cycles will break the link between the biotic and abiotic factors.
- (iv) Therefore, equilibrium is necessary between bio-geo-chemical cycles.

✓(3) **Flow of nutrients through an ecosystem is cyclic.**

Ans.

- (i) All organisms need nutrients for their growth.
 - (ii) The nutrients carbon, oxygen, nitrogen, iron, calcium etc. are circulated and recycled from the biosphere to living organisms and after their death back to the biosphere.
 - (iii) Nutrients are taken up by plants and then passed on to the consumers.
 - (iv) Eventually, after their death, all types of consumers, are decomposed by decomposers like bacteria and fungi and the nutrients are again released into the biosphere and are, used again by living organisms.
- Therefore, flow of nutrients through an ecosystem is cyclic.

(2) Carbon Cycle and Nitrogen Cycle.

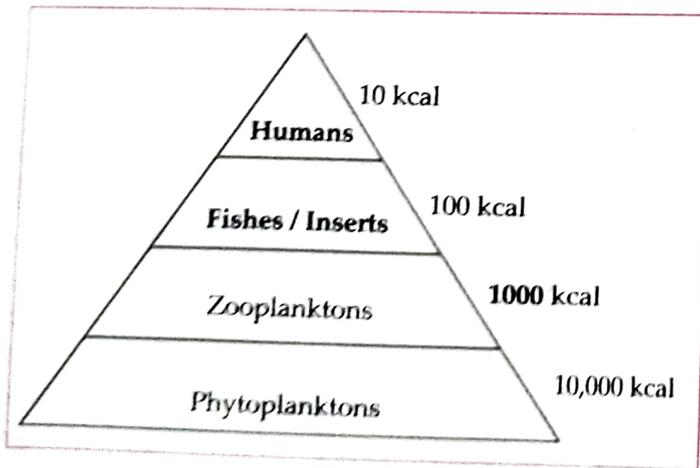
Ans.	Carbon Cycle	Nitrogen Cycle
	(i) The circulation and recycling of carbon from the atmosphere to living organisms and after their death back to the atmosphere is called carbon cycle.	(i) The circulation and recycling of nitrogen in the form of different compounds through various biotic and abiotic processes in nature is called the nitrogen cycle.
	(ii) Main processes involved in carbon cycle are photosynthesis and respiration.	(ii) Main processes involved in nitrogen cycle are nitrogen fixation, ammonification, nitrification and denitrification.
	(iii) Carbon in the form of carbon dioxide is directly absorbed by plants for photosynthesis.	(iii) Nitrogen gas cannot be directly absorbed by plants. So nitrogen is fixed by the process of nitrogen fixation and then absorbed from the soil.

(3) Flow of matter and Flow of energy.

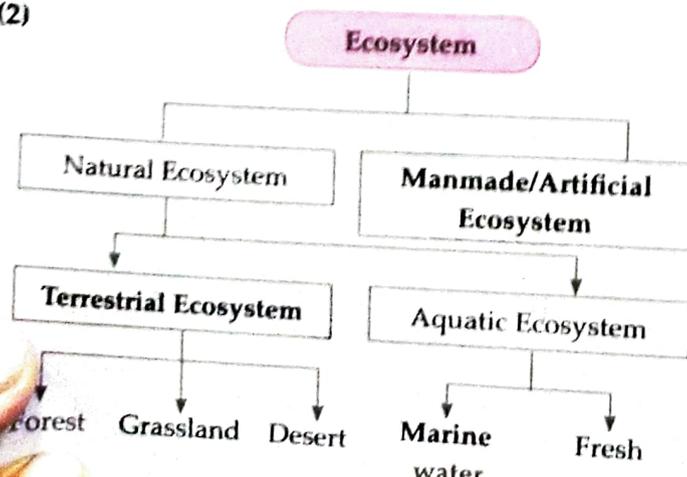
Ans.	Flow of matter	Flow of energy
	(i) It involves circulation and recycling of nutrients in a cyclic manner within the biosphere.	(i) It involves the flow of energy from one trophic level to another in unidirectional or non-cyclic manner.
	(ii) There is no dissipation of matter at any level.	(ii) There is dissipation of energy at every level.
	(iii) Biosphere is the source of nutrients.	(iii) The Sun is the most important source of energy.

Q.2. (B) 2 Complete the flow chart:

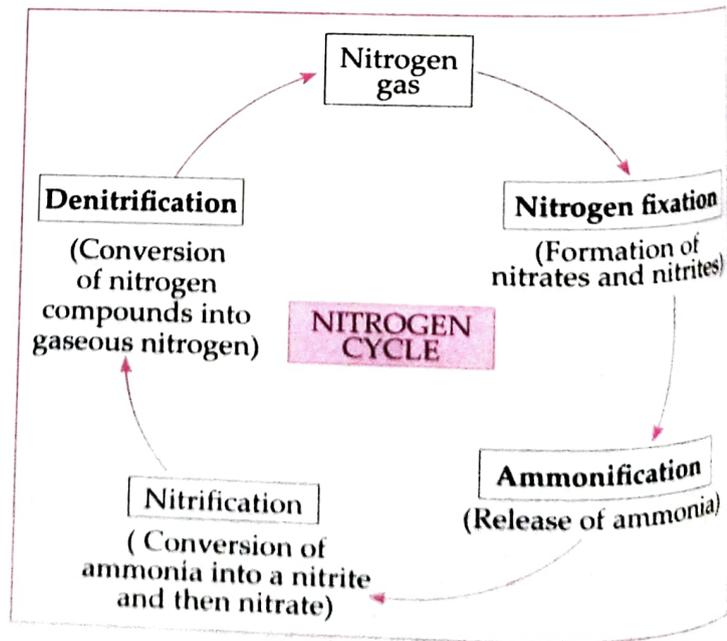
(1) Energy Pyramid.



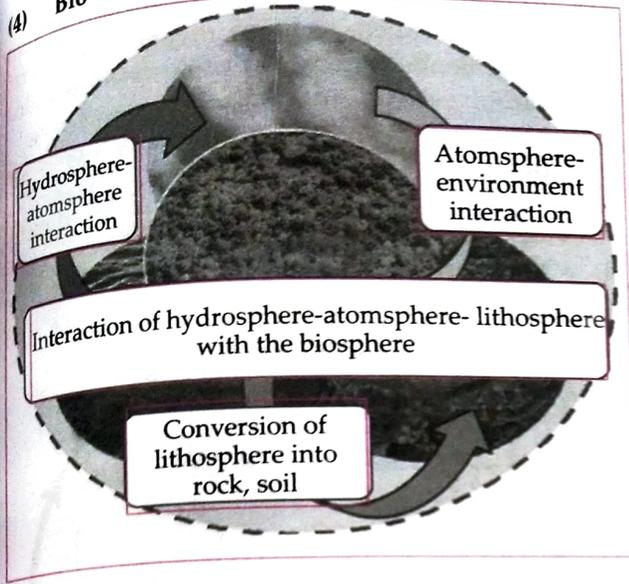
(2)



(3) Nitrogen Cycle



(4) Bio-Geo Chemical cycle



Q.2. (B) 3. Write short notes on:

(1) Trophic level.

Ans.

- (i) Each level in the food chain is called a trophic level.
- (ii) A trophic level is the step at which the organism obtains its food in the chain.
- (iii) The amount of matter and energy gradually decreases from producers at the lowest level to the top consumers at the highest level.

(2) Food web.

Ans.

- (i) An ecosystem consists of many food chains that are interconnected at various levels. This is called food web.
- (ii) An organism may be the prey for many other organisms.
- (iii) For example, an insect feeds upon leaves of various plants but the same insect is the prey for different animals like wall lizards, birds etc.
- (iv) This forms an intricate web instead of a linear food chain. Such an intricate network is called as food web.
- (v) Generally food webs are formed everywhere in nature.

(3) Energy Pyramid.

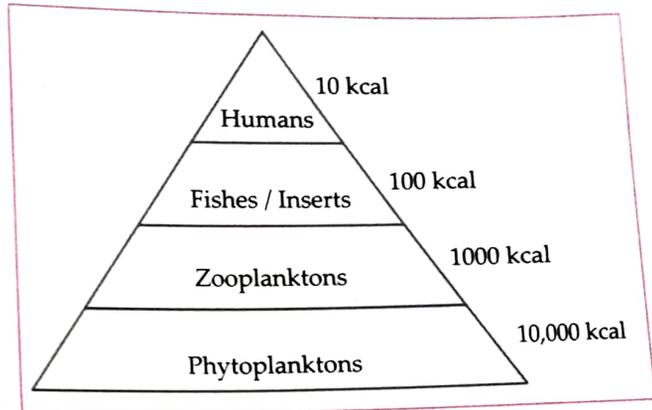


Fig. 7.1 : Energy Pyramid in an ecosystem

Ans.

- (i) Each level in the food chain is called a trophic level.
- (ii) The amount of matter and energy gradually decreases from producers at the lowest level to the top consumers at the highest level.
- (iii) The initial quantity of energy goes on decreasing at every level of energy exchange.
- (iv) Similarly, the number of organisms also decreases from the lowest level to the higher level.
- (v) This pattern of energy exchange in an ecosystem is called a Pyramid of energy.

Q.3.1. Explain the following statements

(1) Justify the statements

- (a) Producers form the first trophic level in the food chain. Herbivores depend directly on producers.
- (b) The flow of nutrients in an ecosystem is cyclic.
- (c) Plants in an ecosystem are called autotrophs.

Ans.

- (i) So herbivores form the second trophic level whereas carnivores depend on herbivores they form the third trophic level in the chain.
- (ii) The nutrients are circulated and recycled in the biosphere to living organisms and their death back to the biosphere.
- (iii) They produce their own food by the process of photosynthesis. All animals in an ecosystem depend on them for food.

(viii) In this way, carbon is continuously passed on from one living organism to another. After the death of living organisms, carbon goes to the atmosphere and is again taken up by living organisms.

*** (b) Nitrogen cycle.**

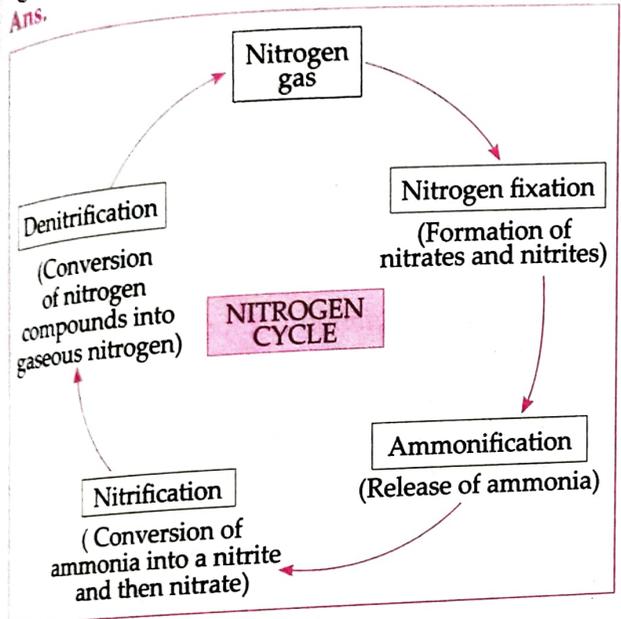


Fig. 7.6 : The nitrogen cycle

- (i) Nitrogen forms 78% i.e. the maximum portion of the atmosphere. It is necessary for the maintenance of the cycle of nature.
- (ii) The circulation and recycling of nitrogen gas into the form of different compounds through various biotic and abiotic processes in nature is called the nitrogen cycle.
- (iii) All organisms participate in the nitrogen cycle. It is an important component of proteins and nucleic acids.
- (iv) As compared to other elements, it is inactive and does not easily combine with other elements. Most organisms cannot use the free form of nitrogen.
- (v) Important processes of nitrogen cycle:
 - (a) Nitrogen fixation: Conversion of nitrogen into nitrates and nitrites through atmosphere, industrial and biological processes.
 - (b) Ammonification: Release of ammonia through decomposition of dead bodies and excretory wastes of organisms.

- (c) Nitrification: Conversion of ammonia into a nitrite and then nitrate.
- (d) Denitrification: Conversion of nitrogen compounds into gaseous nitrogen.

*** (c) Oxygen cycle.**

Ans.

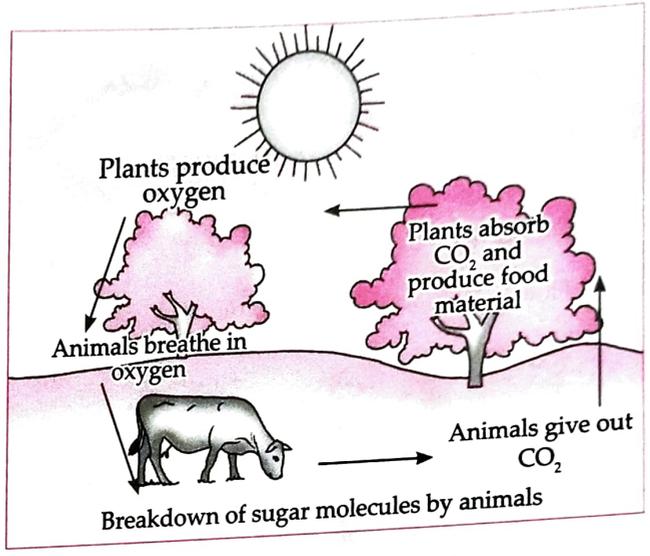


Fig. 7.7 : The oxygen cycle

- (i) Oxygen forms 21% of the atmosphere. It is also present in the hydrosphere and lithosphere. Circulation and recycling of oxygen within the biosphere is called the oxygen cycle.
- (ii) This cycle, includes both the biotic and abiotic components. Oxygen is continuously produced as well as used up in the atmosphere.
- (iii) Oxygen is highly reactive and it readily reacts with other elements and compounds.
- (iv) As oxygen is found in various forms like molecular oxygen (O_2), water (H_2O), carbon dioxide (CO_2), inorganic compounds etc, the oxygen cycle of the biosphere is extremely complex.
- (v) Oxygen is released in the process of photosynthesis, whereas it is used up in processes like respiration, combustion, decomposition, corrosion, rusting, etc.

- (v) Nutrients from the biosphere enter the bodies of plants and animals. Eventually, after death, all types of consumers are decomposed by decomposers like bacteria and fungi and they are again released into the biosphere and are used again by living organisms.
- (vi) Therefore, these cycles help in maintaining the flow of nutrients and energy through ecosystem and maintaining the equilibrium in the ecosystem.

*** (4) Explain the following with suitable examples. What type of changes occur in the amount of energy during its transfer from plants to apex consumers?**

Ans.

- Plants of the ecosystem store some of the solar energy in the form of food.
- Before reaching the decomposers, this energy is passed on from one trophic level to the next.
- At every trophic level, some amount of energy is used by the organism for its own life processes and some amount of energy is lost to the surroundings.
- Decomposers dissipate some amount of energy in the form of heat.
- However, no part of the energy ever returns to the Sun. Hence, such passage of energy is referred to as 'one way' transport.
- Therefore, energy is maximum at the base of the pyramid and is least at the apex, e.g. phytoplanktons which form the base of the pyramid have 10,000 kcal of energy while humans at apex have 10 kcal of energy.

(5) Write the important processes of nitrogen cycle.

Ans.

- Nitrogen fixation:** Conversion of nitrogen into nitrates and nitrites through atmospheric, industrial and biological processes.
- Ammonification:** Release of ammonia through decomposition of dead bodies and excretory wastes of organisms.
- Nitrification:** Conversion of ammonia into a nitrite and then nitrate.
- Denitrification:** Conversion of nitrogen components into gaseous nitrogen.

(6) Explain the following questions with suitable diagrammatic representation:

*** (a) Carbon cycle.**

Ans.

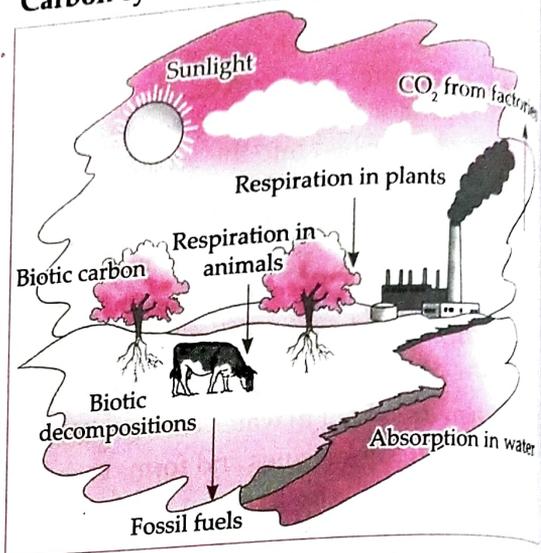


Fig. 7.5 : The carbon cycle

- The circulation and recycling of carbon from the atmosphere to living organisms and after their death back to the atmosphere is called the carbon cycle.
- Abiotic carbon atoms are circulated and recycled into biotic form mainly through photosynthesis and respiration. Hence, the carbon cycle is one of the important bio-geo-chemical cycles.
- Plants convert carbon dioxide into carbohydrates by the process of photosynthesis.
- Similarly, they produce carbon compounds like proteins and fats, too.
- Carnivores feed upon herbivores. In this way, biotic carbon is transported from plants to herbivores, from herbivores to carnivores and from carnivores to apex consumers.
- Main processes in the carbon cycle

$$6\text{CO}_2 + 12\text{H}_2\text{O} \xrightarrow[\text{Chlorophyll}]{\text{Sunlight}} \text{C}_6\text{H}_{12}\text{O}_6 + 6\text{H}_2\text{O} + 6\text{O}_2 \uparrow$$

$$\text{C}_6\text{H}_{12}\text{O}_6 + 6\text{O}_2 \xrightarrow{\text{Mitochondria}} 6\text{CO}_2 \uparrow + 6\text{H}_2\text{O} + \text{Energy}$$
- Eventually, after death, all types of consumers are decomposed by decomposers like bacteria and fungi and carbon dioxide is released again into the atmosphere and is used again by living organisms.