For BioResire students


# NEET Biology Material

## Elite Batch

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# ECOSYSTEM

## STRUCTURE OF ECOSYSTEM

Ecosystem is a functional unit of nature where living organisms interact with each other and with the physical environment

## COMPONENTS OF ECOSYSTEM

- **Biotic**
  - (i) Autotrophs.
  - (ii) Herbivores.
  - (iii) Carnivores
- **Abiotic**
  - (i) Pond.
  - (ii) River
  - (iii) Wind

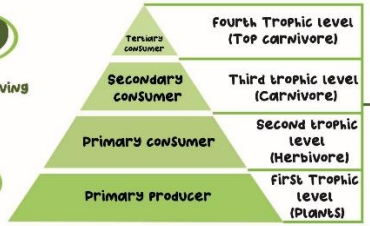
## TYPES OF ECOSYSTEM

- TERRESTRIAL Eg. forest, desert, etc
- AQUATIC Eg:. Lake, pond, wet land etc
- Human-made Eg: Aquarium, crops fields

## STRATIFICATION

Distribution of different species at different levels

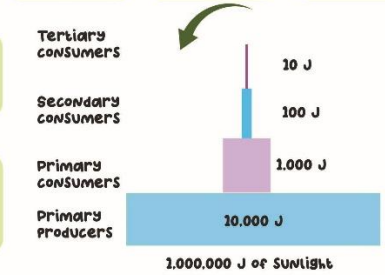
## TROPHIC LEVELS




Specific position occupied by an organisms in a food chain

## ECOLOGICAL PYRAMIDS

- PYRAMID OF NUMBER
- PYRAMID OF BIOMASS
- PYRAMID OF ENERGY




## TYPES

### GRAZING FOOD CHAIN

Begins with producers present at first trophic level. Primary consumer feeds on producers.


### DETRITUS FOOD CHAIN

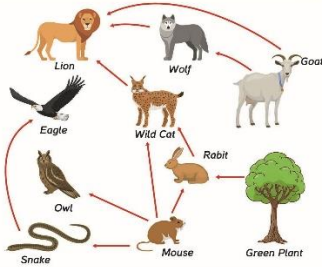
Begins with detritus such as dead remains of plants and animals.

Feeding relationship between organisms of different trophic levels

## FOOD CHAIN

## FOOD WEB

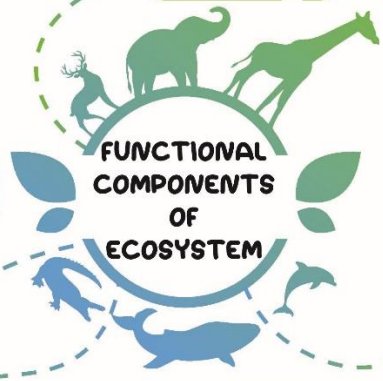
Interconnection of food chains




## ENERGY FLOW

### 10% LAW

During transfer of energy from one trophic level to another. Only about 10% is transferred to higher levels: 90% is lost in respiration (heat)




## NUTRIENT CYCLES

- Amount of nutrients such as carbon, nitrogen, phosphorous, calcium and elements present in the soil at any particular time – Standing State
- Nutrient cycling refers to the movement of nutrients across various components of in ecosystem

### TYPES

#### GASEOUS CYCLE

- Reservoir exists in the atmosphere for this cycle
- Example: Nitrogen and Carbons Cycles

#### SEDIMENTARY CYCLE

- Reservoir for this cycle is present in the Earth's crust
- Examples:- Sulphur and Phosphorous cycles

## PRODUCTIVITY

- Rate of biomass production
- Expressed in $g^{-2}$ $yr^{-1}$

### PRIMARY PRODUCTIVITY

- Amount of biomass produced per unit area a time period during photosynthesis
- Expressed in weight ($g^{-2}$ ) or energy (Kcal $m^{-2}$ )

#### TYPES

- GROSS PRIMARY PRODUCTIVITY (GPP)
- NET PRIMARY PRODUCTIVITY (NPP)

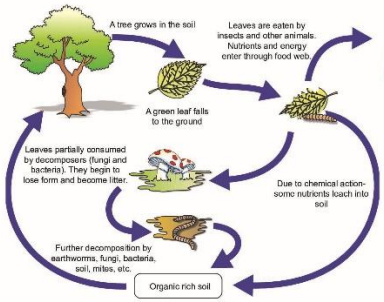
NPP = GPP – R → Respiration losses

### SECONDARY PRODUCTIVITY

The rate of formation of new organic matter by consumers

## DECOMPOSITION

Breakdown of complex organic matter into inorganic substances by the action of decomposers.




### STEPS OF DECOMPOSITION

Fragmentation
↓
Leaching
↓
Catabolism
↓
Humification
↓
Mineralisation

## ECOLOGICAL SUCCESSION

### PRIMARY SUCCESSION

- Occurs in areas where no living organism ever existed
- Examples:- Newly cooled lava, bare rock, newly created pond
- Succession of Plants:-
  (I) Hydrarch (takes place in water areas)
  (II) Xerarch (Take place in dry areas)

#### PRIMARY SUCCESSION ON ROCKS

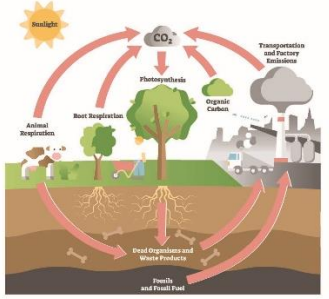
Lichens (Pioneer Species)
↓
Small Plants
↓
Bigger Plants
↓
Stable forest Community (Climax Community)

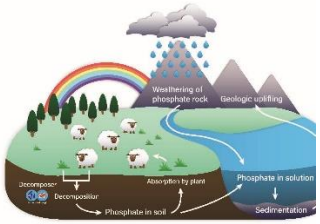
### SECONDARY SUCCESSION

- Occurs in area which have lost all life forms due to destruction & floods
- Examples:- Abandoned farms, burned or cut forests, land that have been flooded

#### PRIMARY SUCCESSION IN WATER

Phytoplankton (Pioneer Species)
↓
Free – floating angiosperms
↓
Rooted hydrophytes
↓
Sedges, grasses
↓
Trees (Climax community is a forest)




## ECOSYSTEM SERVICES OF FOREST

- Purify air and water
- Mitigate droughts and floods
- Generate fertile soil
- Pollinate crops
- Provide storage site for carbon
- Cycle nutrients
- Provide wildlife habitat
- Maintain biodiversity
- Provide aesthetic, cultural & spiritual values

# ECOSYSTEM

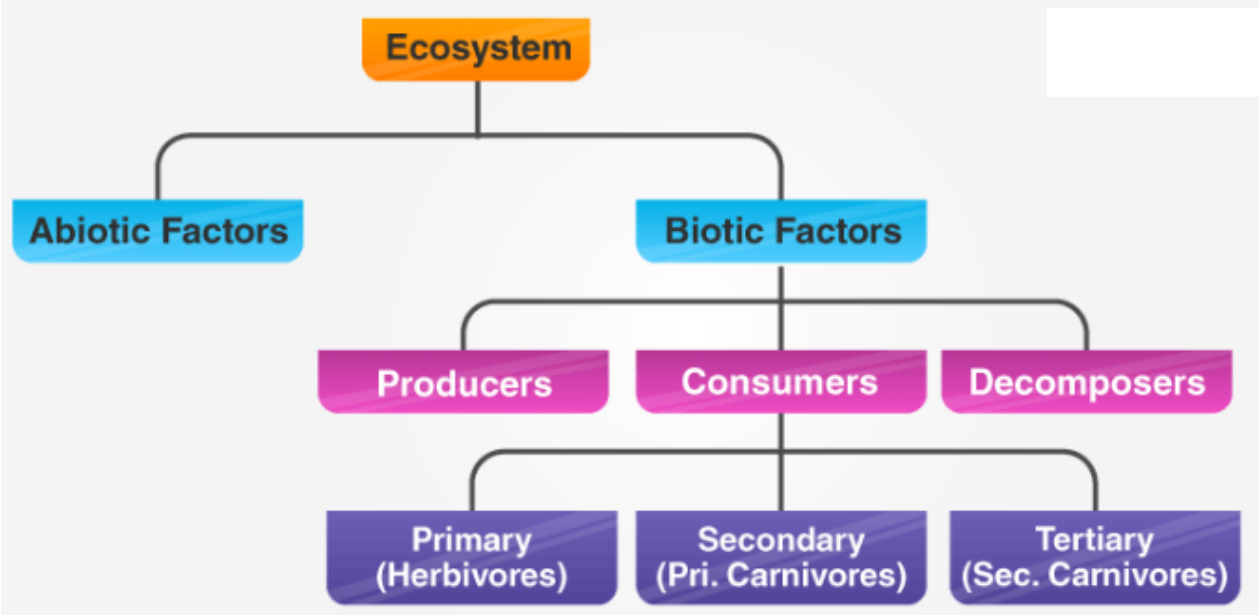
## Ecosystem:

Ecosystem is a biological community where the living and non-living components interact with each other and their physical environment. It is the functional unit of nature and varies greatly in size. Let us have a look at the structure, function and components of ecosystem.

## Structure of Ecosystem:

**The structure of ecosystem comprises two different components:**

1. Biotic
2. Abiotic



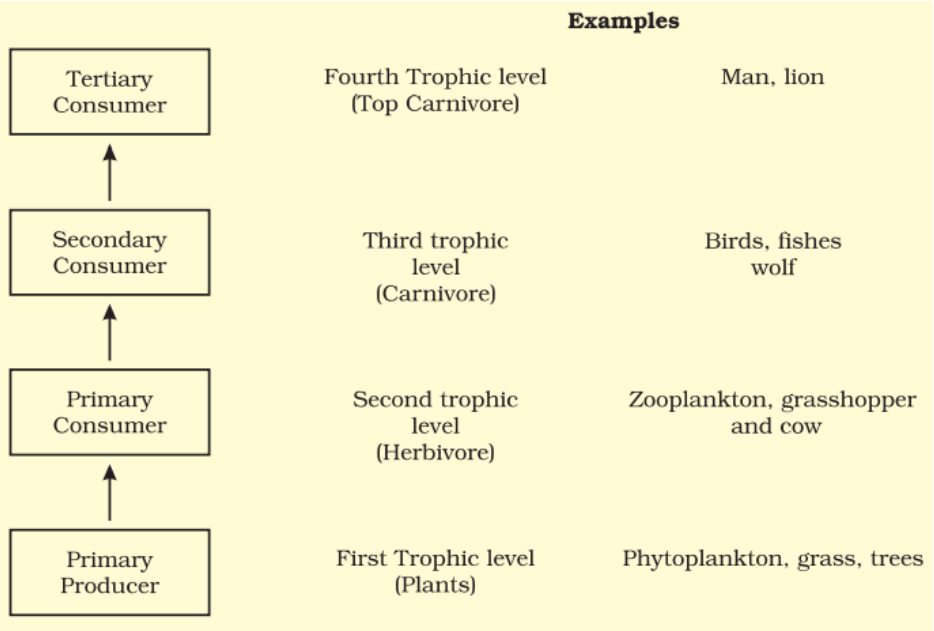

**Biotic Components:**

Biotic Components are the living components involved in shaping the ecosystem.

**It includes biotic factors such as:**

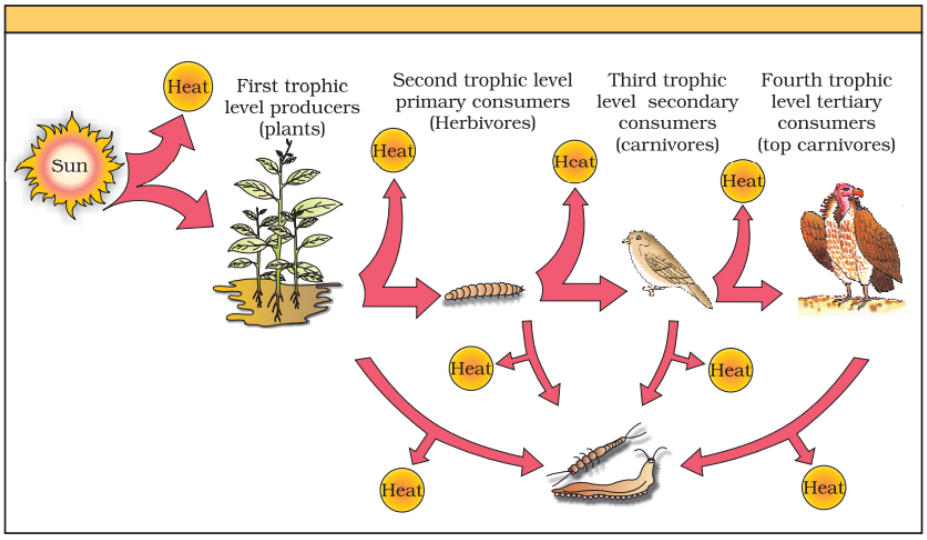
**Producers:** All green plant in the ecosystem are termed as the producers, as they produce their own food by making use of solar energy. All living organisms are dependent on plants for both oxygen and food.

**Consumers:** They include both primary consumers and secondary consumers. As animals depend on plants for their food, they are called consumers. Primary consumers feed directly of Producers for their food and the secondary consumers feed on the primary consumers for their food. All herbivores animals are an example of Primary consumers. Carnivores and apex predators make up the secondary and tertiary consumers.




**Decomposers:** They are the saprophytes which include fungi and bacteria. Decomposers convert the dead matter into nitrogen and carbon dioxide and the process is called decomposition.

Energy **Flow:** Energy flow is the flow of energy along the food chain, through different trophic levels. Energy is passed from the producers to the decomposers through various trophic levels.




**Abiotic Components:**

Abiotic components include inorganic materials like air, water, and soil.

## Ecosystem Types:

**There are three main types of ecosystem:**

**Terrestrial Ecosystem:**

These are the ecosystem found only on land. The terrestrial ecosystems include:

1. Forest ecosystem
2. Grassland ecosystem
3. Desert ecosystem
4. Mountain ecosystem
5. Aquatic Ecosystem

The aquatic ecosystem is the ecosystem in the water body. It includes:

**Freshwater Ecosystem:**

The freshwater ecosystem can be divided into the following categories:

1. **Lentic:** This includes slow-moving or still water such as lakes, ponds, pools, etc.
2. **Lotic:** This includes fast-moving water bodies such as rivers and streams.
3. **Wetlands:** These include the environment where soil is saturated with water for a certain time period.

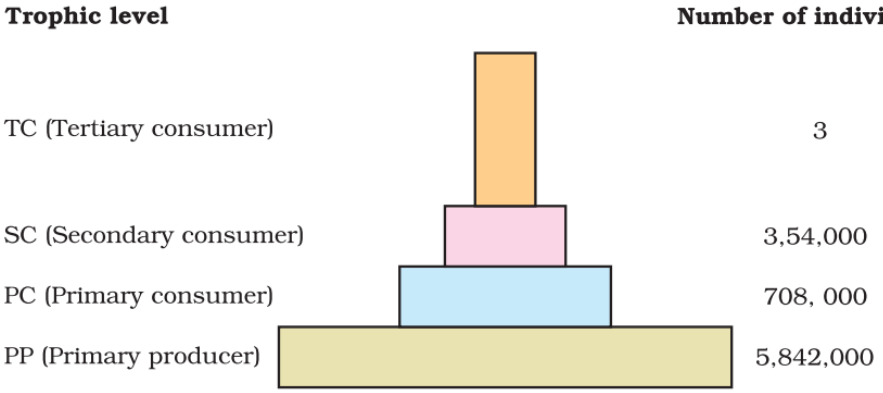
**Oceanic Ecosystem:** The ocean ecosystem is the largest ecosystem. It covers about 71% of the total earth's surface. This is also known as the marine ecosystem and is divided into deep water, shallow water and deep ocean surface. A large variety of corals, echinoderms, brown algae, cephalopods and dinoflagellates are found here.

## Ecological Pyramids:

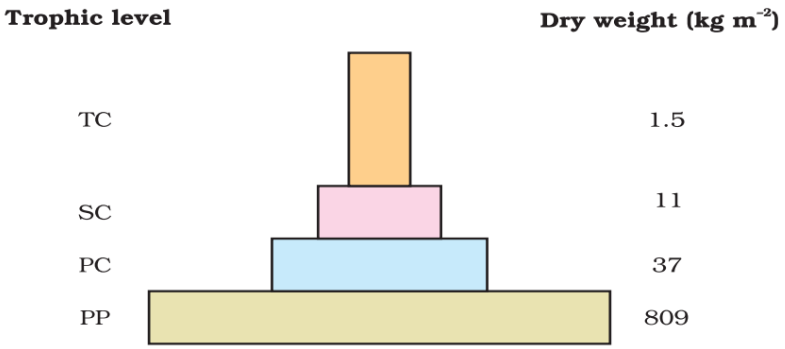
An ecological pyramid is the graphical representation of the relationship between different organisms. Each bar of the pyramid represents a different trophic level.

**The different types of ecological pyramids include:**

**Pyramid of Numbers:** This represents the number of organisms in each trophic level, irrespective of their size.

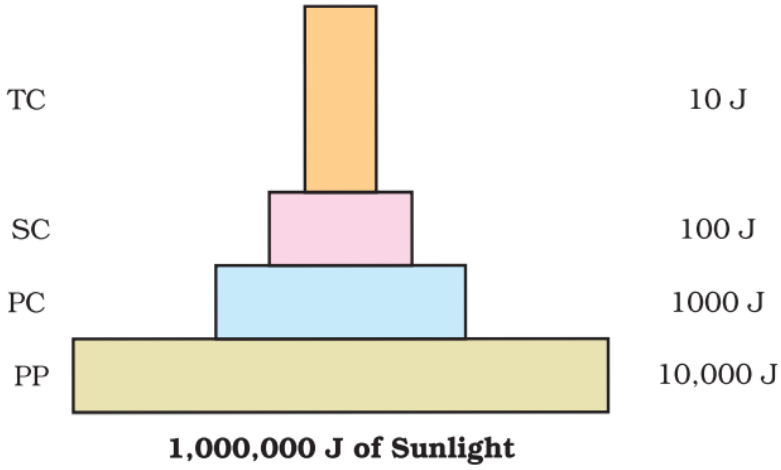



**Pyramid of Biomass:** This represents the total mass of organisms at each trophic level.




**An energy pyramid:** An energy pyramid (sometimes called a trophic pyramid or an ecological pyramid) is a graphical representation, showing the flow of energy at each trophic level in an ecosystem.


**Pyramid of Productivity:** It is the total amount of energy present at each trophic level and the total energy lost between each trophic level.




**Ecological Succession:** Ecological succession refers to the change in the structure of species of an ecological community over time. These are of two types:

**Primary Succession:** This is a type of succession in which plants and animals first colonize a barren piece of land.

**Secondary Succession:** This is the type of succession in which an ecosystem that is destroyed, revives itself.

## Function of Ecosystem:

1. The level of organisms regulates the flow of energy.
2. The autotrophs are the producers that produce energy which is transferred through various trophic levels.
3. The minerals of the biosphere are cycled through the biosphere.

4. It supports life systems and provides stability.

## Decomposition:

It is the process of break down complex organic matter into simpler inorganic substances such as carbon dioxide, water, and nutrients by the action of decomposers.

1. **Detritus:** Dead remains of plants and animals such as leaves, barks, flowers, faecal matter of animals, etc. constitute detritus.
2. **Detritivores:** Organisms that feed on detritus are called detritivores. Earthworms, fungi, etc. are examples of detritivores.

## Steps in Decomposition:

1. **Fragmentation:** It is the breakdown of detritus into smaller particles by the action of detritivores.
2. **Leaching:** It's the phenomenon by which water-soluble nutrients sink to the soil horizon and precipitate as salts that aren't available.
3. **Catabolism:** It is the breakdown of detritus into simple inorganic nutrients by the action of bacterial and fungal enzymes.
4. **Humification:** It is the formation and continuous deposition of a dark-coloured organic amorphous substance called humus. Humus is extremely resistant to microbial action and decomposes at a very slow rate. Because it is colloidal, it acts as a nutrient reservoir.
5. **Mineralization:** It is the process by which some microorganisms further break down humus to form simple inorganic nutrients.

## Ecological Succession:

Ecological succession is the process of change in the structure of species that belongs to an ecological community over time. After a mass extinction, the time scale can be decades or even millions of years. This change occurs orderly and sequential, parallel with the changes in the physical environment.

1. **Pioneer Species:** The species that invade a bare area are called pioneer species.
2. **Pioneer Community:** The community that is capable to invade a bare area is known as the pioneer community.
3. **Climax Community:** A community that is almost near to equilibrium with the environment is called the climax community.
4. **Sere:** A sequence of ecological communities arising in an area from the initial pioneer community to the final climax community.

5. **Primary Succession:** Primary succession is a type of biological and ecological succession of plant life. It occurs in an environment in which a new substrate is deposited. This new substrate is not having any kind of vegetation and other organisms. It also usually lacks soil and organic matter. It occurs in places such as land after a lava flow or area left from the retreated glacier.

6. **Secondary Succession:** Secondary succession is a type of biological and ecological succession of plant life which takes place in a habitat that has been previously populated but has since been disturbed or damaged. For instance, regions where existing vegetation has been removed (due to tree-felling in a woodland or destructive events such as fires).

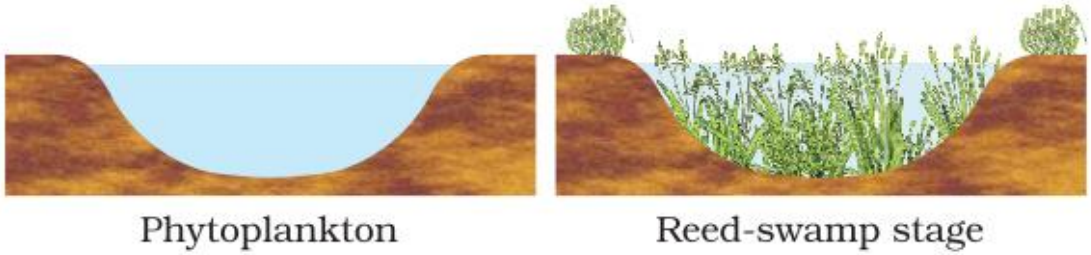
## Succession of Plants:

**Hydrarch:** A succession that begins in a water body or aquatic environment is called Hydrosere or Hydrarch Succession.

**Xerarch:** Xerosere is a succession of plants that are limited in the availability of water availability. It includes the different stages in xerarch succession. Xerosere originates in extremely dry situations such as sand deserts, dunes, salt deserts, rock deserts, etc.

In secondary succession, the invasion of species depends on the availability of water, conditions of the soil, and the environment. It also depends on whether any seeds or other propagules are present. Because soil is already existent, the pace of succession is substantially faster, and the climax community is reached much sooner.

Succession always proceeds towards the mesic community.



Phytoplankton

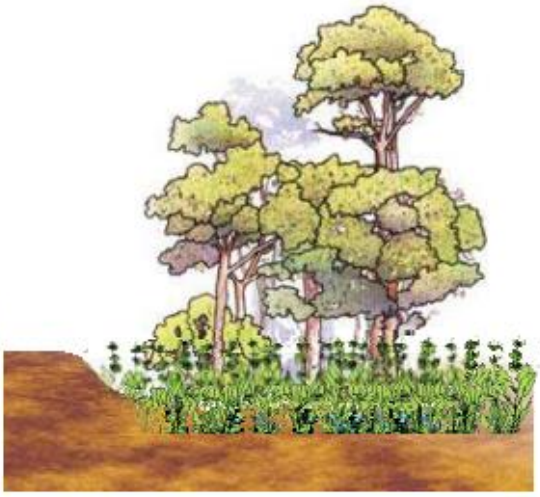


Reed-swamp stage

Submerged plant stage

Marsh-meadow stage

Submerged free floating plant stage



Scrub stage

## Nutrient Cycling:

The movement of nutrients through the various components that belong to an ecosystem is called nutrient cycling. It is also called biogeochemical cycles (bio: living organism, geo: rocks, air, and water).

## Types of Nutrient Cycles:

1. Gaseous.
2. Sedimentary.

**Standing State:** The total amount of various nutrients like nitrogen, carbon, phosphorus, calcium, etc., present in the soil at any given time, is referred to as the standing state. It differs in different kinds of ecosystems and also on the basis of season.

The atmosphere serves as a reservoir for gaseous nutrient cycles (carbon and nitrogen).

The reservoir for the sedimentary nutrient cycle (sulfur, phosphorus, etc.) exists in the earth's crust.

The rate of release of nutrients into the atmosphere is regulated by environmental factors.

The reservoir functions to meet with the deficit occurring due to an imbalance between influx and efflux.

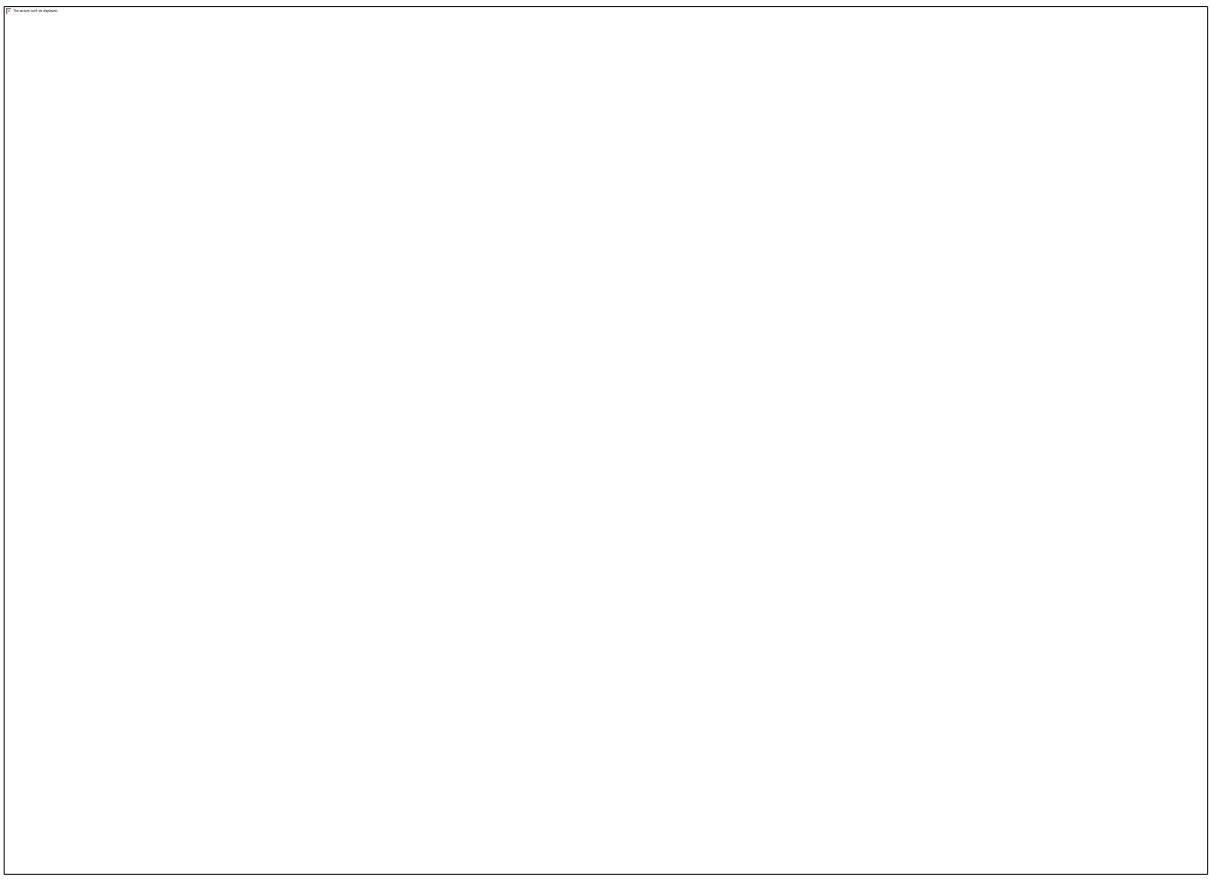
## Ecosystem Carbon Cycle:

Carbon is contained by most of the chemicals that make up living tissue. When the organisms die the carbon contained by them is recycled to be used by future generations. The movement of carbon through the various components of the ecosystem is called the carbon cycle.

1. As a result of respiration and combustion, carbon is released into the environment as $CO_2$.
2. Carbon dioxide is absorbed by producers during the process of photosynthesis to produce carbohydrates.
3. Animals feed on the producers. The food chain causes carbon to move along various trophic levels. During breathing, the majority of the carbon eaten is exhaled as $CO_2$. The animals and plants eventually die.
4. Decomposers eat the dead organisms and break them down. This causes the carbon in their bodies to be returned to the atmosphere as carbon dioxide. In some extraordinary conditions, decomposition is blocked. The plant and animal material may then be turned into fossil fuel for use in the future for combustion.
5. Marine animals may convert some of the carbon in their diet to calcium carbonate which is then used to make the shells for their bodies. Over time these

shells of dead organisms get collected on the seabed and form or converted into limestone. Due to various activities and movements of the earth, this limestone may eventually become exposed to the air where it is subjected to weathering. This results in the back release of carbon into the atmosphere as carbon dioxide. Carbon dioxide is also released through volcanic action.

6. Human activities have significantly influenced the carbon cycle. Rapid deforestation and massive burning of fossil fuels have increased the rate of release of carbon dioxide into the atmosphere.



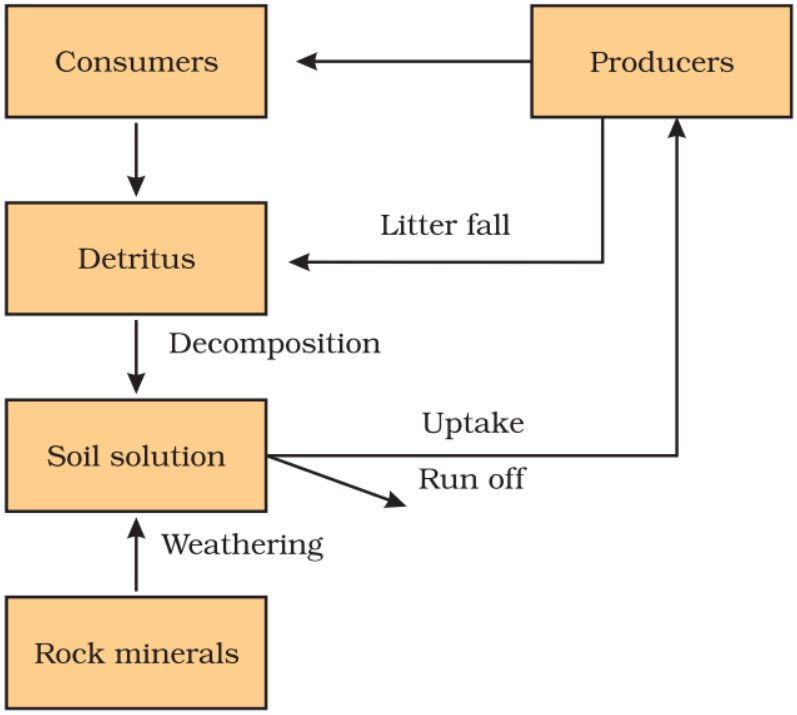
## Phosphorus Cycle:

The phosphorus cycle is the process by which phosphorus moves through the different layers of the atmosphere that is the lithosphere, hydrosphere, and biosphere.

**Steps in Phosphorus Cycle:**

1. **Weathering:** Weathering of uplifted rocks adds phosphates to the land. Eventually, some phosphates reach the ocean again.
2. **Fertilizers:** Phosphate fertilizers from fields might run off straight into the streams. These may later become part of a soil pool or can be absorbed by the plants.

3. **Excretion and Decomposition:** Animal excretion (on land or in the ocean) and animal and plant decomposition both produce phosphates on land and in water.
4. **Dissolved Phosphates:** Dissolved phosphates plays important role in forming ocean sediments by precipitation. The process of conversion of these sediments into phosphate rocks is a very slow and gradual process.
5. **Geological Uplift:** Geologic forces can lift up the phosphate rocks very slowly from the ocean floor or the rocks thick with phosphate in them to form the huge mountains.




## Ecosystem Services:

The results or outcome of ecosystem processes is called ecosystem services.

**Services of Healthy Forest Ecosystems:**

Purification of air and water.

Mitigation of droughts and floods.

1. Cycling of nutrients.
2. Generation of fertile soils.
3. Providing habitats to wildlife.
4. Maintenance of biodiversity.
5. Pollination of crops.
6. To provide storage site for carbon.

7. Providing aesthetic, cultural, and spiritual values.

8. The average price tag of these ecosystem services is estimated to be US $ 33 trillion annually.

9. This is near twice the value of the global gross national product GNP (the US $ 18 trillion).

**The Calculation, Out of the Total Cost of Various Ecosystem Services:**

1. Soil formation accounts for about 50% of the ecosystem services.

2. Recreation for about 10% of these services.

3. Nutrient cycling about 10% of them.

The cost of climate regulation and habitat dark approximate 6% each.

## NCERT LINE BY LINE QUESTIONS

### 14.1 Ecosystem: Structure and Function

1. Vertical distribution of different species occupying different levels is called as

A) Standing crop B) Standing state C) Stratification D) Decomposition

**Page-242, Easy**

2. Identification and enumeration of plant and animal species of an ecosystem gives its

A) Productivity B) Species composition

C) Physical structure D) Vertical distribution

**Page-242, Easy**

3. Which one of the following is odd one out from others

A) Decomposition B) Energy flow C) Nutrient cycling D) None

**Page-242, Easy**

4. The autotrophic components include

A) Phytoplankton B) Some algae C) Marginal plants D) All of these

**Page-242, Easy**

5. The decomposers is/are the

A) Fungi B) Bacteria C) Flagellates D) All of these

**Page-242, Easy**

6. The consumers is/are

A) Zooplankton B) Phytoplanktons C) Marginal plants D) All of these

**Page-242, Easy**

## 14.2 Productivity

7. What is the basic requirement for any ecosystem to function and sustain.

A) Primary production B) Decomposers

C) Constant input of solar energy D) Nutrient cycling

**Page-242, Easy**

8. _____ is defined as the amount of biomass or organic matter produced per unit area over a time period by plants during photosynthesis

A) Gross primary productivity B) Primary production

C) Secondary production D) None of these

**Page-242, Easy**

9. Primary production is expressed as-

A) K $Calm2$ B) K $Cal/m2$ C) $g/m2$ D) both B & C

**Page-243, Easy**

10. _____ of an ecosystem is the rate of production of organic matter during photosynthesis

A) Net primary productivity B) Secondary production

C) Gross primary productivity D) None of these

**Page-243, Easy**

11. Net primary productivity (NPP) equals to

A) NPP = R – GPP B) GPP – R = NPP C) NPP = GPP + R D) GPP = R – NPP

**Page-243, Easy**

12. The rate of formation of new organic matter by consumers is called as

A) primary productivity B) Gross primary productivity

C) Secondary productivity D) Respiratory loss

**Page-243, Easy**

13. Primary productivity depends on

A) Variety of environmental factors B) Availability of nutrients

C) Photosynthetic capacity of plant D) All of these

**Page-243, Easy**

14. The annual net primary productivity of the whole biosphere is approximately

A) 190 million tons B) 170 million tons C) 170 billion tons D) None of these

**Page-243, Easy**

## 14.3 Decomposition

15. Which one of the following is called as “farmer’s friend”?

A) Cow B) Bacteria C) Earthworm D) Crops

**Page-243, Easy**

16. Who breaks down complex organic matter into inorganic substances like CO2, water etc.

A) Crop roots B) Decomposers C) Grazing Cattle D) None of these

**Page-243, Easy**

17. The process of breaks down complex organic matter into inorganic substances is called as

A) Fragmentation B) Humification C) Decomposition D) Leaching

**Page-243, Easy**

18. Detritus is/are

A) Dead plant B) Dead animals C) Fecal matter D) All of these

**Page-243, Easy**

19. The correct way of decomposition

A) Fragmentation → leaching → humification → catabolism → mineralization

B) Fragmentation → leaching → catabolism → humification → mineralization

C) Fragmentation → catabolism → leaching → mineralization → humification

D) Fragmentation → mineralization → catabolism → leaching → humification

**Page-243-244, Medium**

20. _____ break down detritus into smaller particles

A) Earthworm B) Detritivores C) Phytoplanktons D) Both A & B are correct

**Page-243, Easy**

21. Bacteria and fungal enzymes degrade detritus into simpler inorganic substances. This process is called as

A) Leaching B) Fragmentation C) Catabolism D) Humification

**Page-243, Easy**

22. Humification leads to accumulation of a dark coloured amorphous substance called _____

A) Pectin B) Humus C) Lignin D) None of these

**Page-244, Easy**

23. Decomposition rate is slower if

A) Detritus rich in lignin & chitin B) Rich in nitrogen & sugars

C) Low in nitrogen & chitin D) Low in lignin

**Page-244, Easy**

24. _____ favours decompositions

A) Warm & dry environment B) Warm & moist environment

C) cold & dry environment D) cold & moist environment

**Page-244, Easy**

## 14.4 Energy flow

25. PAR stands for

A) Percent active radiation B) Photosynthetically active radiation

C) Power angel regulation D) None of these

**Page-245, Easy**

26. Plant capture only _____ of the PAR and this amount of energy sustains the entire living world

A) 50 – 60 % B) 40 – 80 % C) 2 – 10 % D) 20 – 40 %

**Page-245, Easy**

27. The green plant in the ecosystem are called

A) Primary consumer B) Producer
C) Secondary consumer D) None of these
**Page-245, Easy**

28. Producers in an aquatic ecosystem

A) Phytoplankton B) Algae C) Zooplanktons D) Both A & B

**Page-245, Easy**

29. Generally, primary consumers will be

A) Carnivores B) Producers C) Herbivores D) All of these

**Page-245, Easy**

30. In ecosystem, GFC stands for

A) Generic flow control B) Global fund for children

C) Grazing food chain D) None of these

**Page-245, Easy**

31. Decomposers are also known as

A) Autotrophs B) Standing crops C) Saprotrophs D) None of these

**Page-245, Easy**

32. Based on the source of their nutrition or food, organisms occupy a specific place in the food chain that is known as their

A) Food web B) Trophic level C) Niche D) Eco level

**Page-245, Easy**

33. Match the following

| Column I | Column II |
|---|---|

| | | | |
|---|---|---|---|
| i | Plants | a | Lion |
| ii | Carnivores | b | Phytoplanktons |
| iii | Herbivores | c | Wolf |
| iv | Top Carnivores | d | Cow |

35. The standing crop is measured as the

A) Mass of living organisms B) Biomass

C) The no. in a unit area D) All of these

**Page-247, Easy**

36. Choose the correct sequence –

A) Producer → herbivore → primary carnivore → secondary carnivore

B) Producer → primary carnivore →herbivore → secondary carnivore

C) Primary carnivore → secondary carnivore → herbivore → Producer

D) None of these

**Page-247, Easy**

## 14.5 Ecological Pyramids

37. Ecological pyramids are

A) Pyramid of number B) Pyramid of energy

C) Pyramid of biomass D) All of these

**Page-247-249, Easy**

38. The pyramid of biomass in sea is

A) Always upright B) Generally inverted

C) Both A & B D) None of these

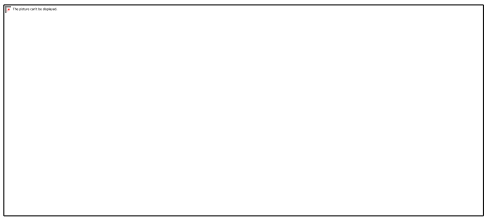
**Page-249, Easy**

39. Pyramid of energy is

A) Always inverted B) Sometime upright C) Always upright D) Sometimes inverted

**Page-249, Easy**

40. Identify the pyramid

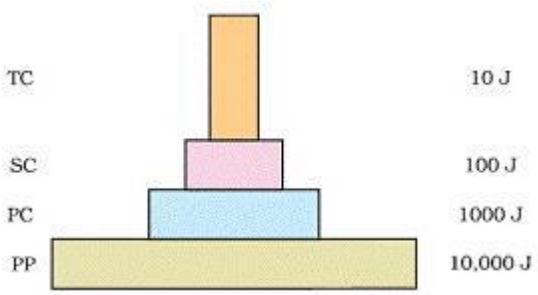


A) Pyramid of number B) Pyramid of biomass

C) Pyramid of energy D) None of these

**Page-248, Easy**

41. Identify the pyramid

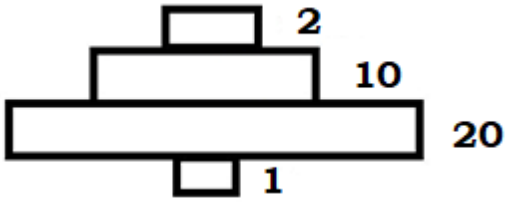



A) Pyramid of number B) Pyramid of biomass

C) Pyramid of energy D) None of these

**Page-249, Easy**

42. Identify the pyramid




A) Pyramid of number B) Pyramid of biomass

C) Pyramid of energy D) None of these

**Page-248, Easy**

## 14.6 Ecological succession

43. A community that is in near equilibrium with the environment is called as

A) Pioneer community B) Middle community

C) Climax community D) Sere

**Page-250, Easy**

44. The gradual and fairly predictable change in the species composition of a given area is called

A) Hydrarch succession B) Ecological succession

C) Pioneer succession D) None of these

**Page-250, Easy**

45. The entire sequence of communities that successively change in a given area are called

A) Ecosystem B) Pioneer C) Sere D) All of these

**Page-250, Easy**

46. Areas where primary succession occurs

A) Bare rock B) Newly cold lava

C) Newly created pond D) All of these

**Page-250, Easy**

47. Secondary succession begins in areas where

A) No living organism are there

B) Lost all the living organism

C) Natural biotic communities have been destroyed

D) Both B & C

**Page-251, Easy**

48. Areas where secondary succession occurs

A) Burned and cut forests areas B) Land that have been flooded

C) Abandoned farm lands D) All are correct

**Page-251, Easy**

49. Select the correct statement

A) secondary succession is faster than primary succession

B) primary succession is faster

C) Both are a equal speed

D) None of these

**Page-251, Easy**

50. The individual transitional communities are termed as

A) Seral stages B) Pioneer C) Seral communities D) Both A & C are correct

**Page-250, Easy**

### 14.6.1 Succession of plants

51. Which type of succession takes place in wet areas

A) Hydrarch succession B) Xerarch succession

C) Mesarch succession D) None of these

**Page-251, Easy**

52. Xerarch succession occurs in

A) Wet areas B) Cold areas C) Dry areas D) All of these

**Page-251, Easy**

53. The species that invade a bare area called

A) Sere B) Pioneer species C) Climax species D) None of these

**Page-251, Easy**

54. In hydrarch succession the successional series progress from

A) Mesic to hydric condition B) Hydric to mesic condition

C) Hydric to xeric condition D) Xeric to mesic condition

**Page-251, Easy**

55. In xerarch succession, the succession series progress from

A) Xeric to hydric condition B) Xeric to mesic condition

C) Mesic to xeric condition D) None of these

**Page-251, Easy**

56. Which one of the following occur as a pioneer species on rocks

A) Bryophytes B) Phytoplankton C) Lichens D) Blue algae

**Page-251, Easy**

57. Choose the correct sequence of succession in water

A) Phytoplanktons → rooted-submerged plants → rooted floating angiosperms → free floating plants → reed swamp → marsh-meadow → scrub → the trees → forest

B) Phytoplanktons → free floating plants → rooted-submerged plants → rooted floating angiosperms → reed swamp → scrub → marsh-meadow → the trees → forest

C) Phytoplanktons → rooted-submerged plants → reed swamp → rooted floating angiosperms → free floating plants → marsh-meadow → scrub → the trees → forest

D) None of these

**Page-251, Easy**

58. Choose the correct statement-

A) All succession whether taking place in water or on land, proceeds to a different climax community

B) All succession whether taking place in water or on land, proceeds to a similar climax community the mesic

C) All succession whether taking place in water or on land, proceeds to a similar climax community the xeric

D) All of these

**Page-251, Easy**

59. Which one of the following is not the part of hydrarch succession

A) Scrub stage B) Tree C) Zooplankton D) Submerged plant stage

**Page-251, Easy**

60. During succession some species colonise an area and their population become more numerous whereas population of other species

A) Increases B) Decline and even disappear

C) Migrate D) None of these

**Page-251, Easy**

61. Why does secondary succession is faster?

A) Because soil is already there B) They have special power

C) Growth of plants is faster D) All of these

**Page-251, Easy**

62. The climax community remains _____ as long as the environment remains _____.

A) Unstable, unchanged B) Stable, unchanged

C) Stable, changed D) Stable, changed

**Page-251, Easy**

63. The word (term) use for medium water conditions

A) Xeric B) Hydric C) Mesic D) None of these

**Page-251, Easy**

64. Choose the correct sequence

i) lichens

ii) Grasses

iii) Bryophytes

iv) Higher plants

v) Forest

A) i → ii → iii → iv → B) i → iii → ii → iv → v

C) i → iv → ii → iii → v D) v → iv → i → ii → iii

**Page-251, Easy**

65. in hydrarch succession, after climax with time the water body is converted into

A) River B) Ocean C) Land D) None of these

**Page-251, Easy**

66. In hydrarch succession, the pioneer and climax community are respectively

A) Forest, Phytoplanktons B) Phytoplanktons, Forest

C) Mess, Trees D) Lichen, Trees

**Page-251, Easy**

## 14.7 Nutrient Cycling

67. The amount of nutrients such as carbon, nitrogen, phosphorus, calcium etc present in the soil at any given time is referred to as the

A) Nutrients cycle B) Standing crop C) Standing state D) None of these

**Page-253, Easy**

68. Standing state varies in

A) Different kinds of ecosystem B) On a season basis

C) Different kinds of nutrients D) Both A & B

**Page-253, Easy**

69. The movement of nutrients elements through the various components of an ecosystem can be called

A) Gaseous cycle B) Nutrient cycling C) Sedimentary cycle D) All of these

**Page-253, Easy**

70. Another name of nutrient cycling is

A) Gaseous cycle B) Biological cycle

C) Biogeochemical cycle D) Biophysical

**Page-253, Easy**

71. Reservoir for gaseous type of nutrient cycle

A) Earth's crust B) Rock C) The atmosphere D) Water bodies

**Page-253, Easy**

72. Reservoir for sedimentary type of Nutrient cycle

A) Ocean B) Earth's crust C) Rock D) Atmosphere

**Page-253, Easy**

73. Environmental factor to regulate the rate of release of nutrients into the atmosphere.

A) Soil B) Moisture C) Temperature & pH D) All of the above

**Page-253, Easy**

74. Reason behind nutrients never lost from ecosystem.

A) Because nutrients present in large amount

B) Because they are recycled

C) Because they have no use

D) All of the above

**Page-253, Easy**

### 14.7.1 Ecosystem-Carbon Cycle

75. Percent of carbon constitutes in dry weight of organism

A) 60% B) 39% C) 49% D) 71%

**Page-254, Easy**

76. Which is the first & second most abundant constituent of an organism?

A) Water, phosphorus B) Water, carbon C) Carbon, water D) Carbon, phosphorus

**Page-254, Easy**

77. How much of total quantity of global carbon is dissolved in the oceans?

A) 88% B) 75% C) 81% D) 71%

**Page-254, Easy**

78. Carbon cycling occurs through

A) Atmosphere B) Living & dead organism

C) Ocean D) All of the above

**Page-254, Easy**

79. How much at carbon in fixed annually in the biosphere through photosynthesis?

A) $8 \times 1012$ kg B) $4 \times 1012$ kg C) $4 \times 1013$ kg D) $4.9 \times 10$ kg

**Page-254, Easy**

80. Additional sources for releasing $CO_2$ in the atmosphere is/are-

A) Burning of wood B) Forest fire C) Fossil fuel D) All of the above

**Page-254, Easy**

81. Human activities have significantly increased the rate of released of $CO_2$ into the atmosphere by

A) Rapid deforestation B) Massive burning of fossil

C) Both A and B D) None of the above

**Page-254, Easy**

### 14.7.2 Ecosystem-Phosphorus Cycle

82. Phosphorus is a major constituent of

A) Biological membranes B) Nucleic acids

C) Cellular energy transfer unit D) All of the above

**Page-254, Easy**

83. Rock is the natural reservoir of

A) Carbon B) Nitrogen C) Phosphorus D) None at these

**Page-254, Easy**

84. Herbivores & other animals obtain Phosphorus from

A) Rock B) Plants C) Ocean D) Lake

**Page-254, Easy**

85. The waste products and the dead organism are decomposed by _____ releasing phosphorus.

A) Fungi B) Phosphate-solubilising bacteria

C) Phosphate-unsolubising bacteria D) None of the above

**Page-254, Easy**

86. Choose the correct statement.

A) Atmospheric inputs of phosphorus through rainfall are much smaller than carbon inputs.

B) Atmospheric inputs of phosphorus through rainfall are larger than carbon inputs.

C) Atmospheric inputs of phosphorus through rainfall are equal to the carbon inputs.

D) None of the above

**Page-254, Easy**

87. Choose the more correct statement.

A) Gaseous exchange at phosphorus b/w organism & environment are very high.

B) Gaseous exchange of phosphorus b/w organism & environment are low.

C) Gaseous exchange at phosphorus b/w organism & environment are negligible.

D) None at these

**Page-254, Easy**

88. In natural resevoirs, phosphorus present in the form of

A) Phosphite B) Pyrophosphate

C) Phosphates D) None of the above

**Page-254, Easy**

89. Identify the blanks

| | | | | |
|---|---|---|---|---|
| A) | Detritus | Weathering | Soil Solution | Litter fall |
| B) | Litter fall | Weathering | Detritus | Soil solution |
| C) | Weathering | Litter fall | Soil solution | Detritus |
| D) | Detritus | Soil solution | Litter fall | Weathering |

**Page-254, Medium**

90. Which one of the following is not a Gaseous nutrient cycle?

A) Oxygen cycle B) Nitrogen cycle C) Sulphur cycle D) None of the above

**Page-254, Easy**

91. Animals need large quantities of phosphorus to make

A) Shells B) Teeth C) Bones D) All of the above

**Page-254, Easy**

## 14.8 Ecosystem Services

92. The products of ecosystem processes are named as

A) Environmental services B) Ecosystem goods

C) Ecosystem services D) All of the above

**Page-255, Easy**

93. Healthy ecosystems are the base for a

A) Wide range of economic B) Environmental

C) Aesthetic goods & services D) All of the above

**Page-255, Easy**

94. Examples of Ecosystem services

A) Healthy forest ecosystem purify air & water

B) Generate fertile soil

C) Provide storage site for carbon

D) All of the above

**Page-255, Easy**

95. _____ & his colleagues have very recently tried to put price tags on nature's life-support services.

A) Robert frost B) Robert Constanza C) Robert hook D) Robert Clive

**Page-255, Easy**

96. Researchers have put an average price tag of _____ a year on fundamental ecosystem services.

A) US $ 33 billion B) US $ 44 billion C) US $ 44 trillion D) US $ 33 trillion

**Page-255, Easy**

97. GNP stands for

A) Grand national product B) Gross national product

C) Gross national produce D) None of these

**Page-255, Easy**

98. Out of the total cost at various ecosystem services the soil formation accounts for about.

A) 40% B) 60% C) 50% D) 30%

**Page-255, Easy**

99. The cost of climate regulation & habitat for wildlife are

A) 8% each B) 6% at overall C) 6% each D) None at the above

**Page-255, Easy**

100. The value of the global GNP

A) US $ 28 trillion B) US $ 18 Billion C) US $ 33 trillion D) US $ 18 trillion

**Page-255, Easy**

101. Choose the correct statement.

A) Value of Ecosystem services at biodiversity is difficult to determine.

B) Value of Ecosystem services of biodiversity is very easy to determine.

C) No need to determine the value of Ecosystem services.

D) None of these

**Page-255, Easy**

## NEET PREVIOUS YEARS QUESTIONS

**1.** What type of ecological pyramid would be obtained with the following data? **[2018]**
Secondary consumer : 120 g
Primary consumer : 60 g

Primary producer : 10 g
(a) Inverted pyramid of biomass (b) Pyramid of energy
(c) Upright pyramid of biomass (d) Upright pyramid of numbers

**2.** Which ecosystem has the maximum biomass? **[2017]**
(a) Grassland ecosystem (b) Pond ecosystem (c) Lake ecosystem (d) Forest ecosystem

**3.** The term ecosystem was coined by : **[2016]**
(a) E.P. Odum (b) A.G. Tansley (c) E. Haeckel (d) E. Warming

**4.** Which of the following is a characteristic feature of cropland ecosystem? **[2016]**
(a) Absence of soil organisms (b) Least genetic diversity
(c) Absence of weeds (d) Ecological succession

**5.** Which of the following would appear as the pioneer organisms on bare rocks? **[2016]**
(a) Lichens (b) Liverworts (c) Mosses (d) Green algae

**6.** Most animals that live in deep oceanic waters are : **[2015]**
(a) secondary consumers (b) tertiary consumers (c) detritivores (d) primary consumers

**7.** Vertical distribution of different species occupying different levels in a biotic community is known as : **[2015]**
(a) stratification (b) zonation (c) pyramid (d) divergence

**8.** The mass of living material at a trophic level at a particular time is called _____. **[2015]**
(a) Standing state (b) Net primary productivity
(c) Standing crop (d) Gross primary productivity

**9.** In an ecosystem the rate of production of organic matter during photosynthesis is termed as : **[2015]**
(a) Gross primary productivity (b) Secondary productivity
(c) Net productivity (d) Net primary productivity

**10.** During ecological succession : **[2015]**
(a) the establishment of a new biotic community is very fast in its primary phase.
(b) the numbers and types of animals remain constant.
(c) the changes lead to a community that is in near equilibrium with the environment and is called pioneer community.
(d) the gradual and predictable change in species composition occurs in a given area.

**11.** An association of individuals of different species living in the same habitat and having functional interactions is : **[2015]**
(a) Biotic community (b) Ecosystem (c) Population (d) Ecological niche

**12.** Secondary succession takes place on/in : **[2015]**
(a) degraded forest (b) newly created pond (c) newly cooled lava (d) bare rock

**13.** Most animals that live in deep oceanic waters are : **[2015]**
(a) tertiary consumers (b) secondary consumers
(c) detritivores (d) primary consumers

**14.** Increase in concentration of the toxicant at successive trophic levels is known as _____. **[2015]**
(a) Biodeterioration (b) Biotransformation (c) Biogeochemical (d) Biomagnification

**15.** In which of the following, both pairs have correct combination? **[2015]**
(a) Gaseous nutrient cycle Carbon and Sulphur Sedimentary nutrient cycle Nitrogen and Phosphorus
(b) Gaseous nutrient cycle Nitrogen and Sulphur Sedimentary nutrient cycle Carbon and Phosphorus
(c) Gaseous nutrient cycle Sulphur and Sedimentary nutrient cycle Phosphorus Carbon and Nitrogen
(d) Gaseous nutrient cycle Carbon and Nitrogen Sedimentary nutrient cycle Sulphur and Phosphorus

**16.** Match the following and select the correct option **[2014]**

| **Column I** | **Column II** |
|---|---|
| A. Earthworm | I. Pioneer species |
| B. Succession | II. Detritivore |
| C. Ecosystem service | III. Natality |
| D. Population growth | IV. Pollination |

(a) A – I; B – II; C – III; D – IV (b) A – IV; B – I; C – III; D – II

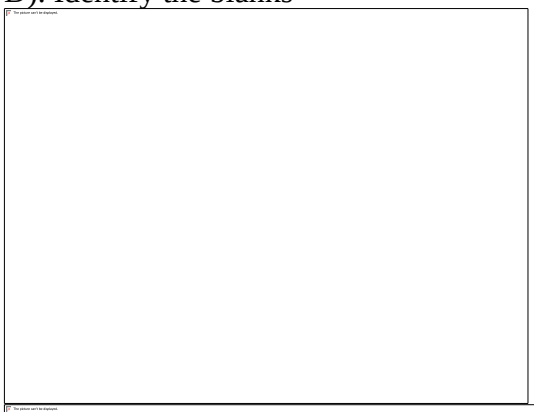
(c) A – III; B – II; C – IV; D – I (d) A – II, B – I; C – IV; D – III

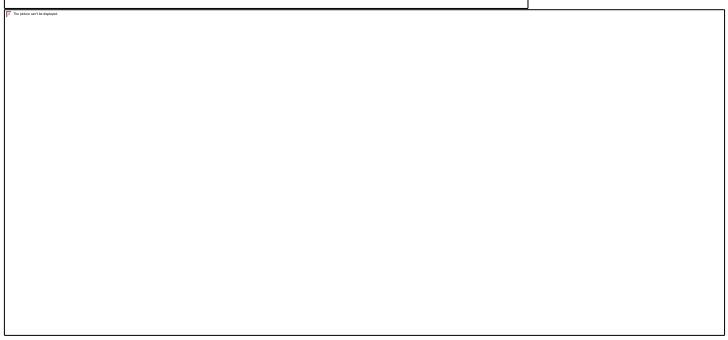
**17.** If 20 J of energy is trapped at producer level, then how much energy will be available to peacock as food in the following chain? **[2014]**

plant mice snake peacock

(a) 0.02 J (b) 0.002 J (c) 0.2 J (d) 0.0002 J

**18.** Given below is a simplified model of phosphorus cycling in a terrestrial ecosystem with four blanks (A-D). Identify the blanks **[2014]**





19. Which of the following ecological pyramids is generally inverted? **(NEET-2019)**

(1) Pyramid of numbers in grassland (2) Pyramid of energy

(3) Pyramid of biomass in a forest (4) Pyramid of biomass in a sea

20. Which of the following statements is incorrect? **(NEET-2020 COVID19)**

(1) Biomass decreases from first to fourth trophic level

(2) Energy content gradually increases from first to fourth trophic level

(3) Number of individuals decreases from first trophic level to fourth trophic level

(4) Energy content gradually decreases from first to fourth trophic level

21. Which of the following statements is incorrect regarding the phosphorus cycle? **(NEET-2020 COVID19)**

(1) Phosphates are the major form of phosphorus reservoir

(2) Phosphorus solubilising bacteria facilitate the release of phosphorus from organic remains

(3) There is appreciable respiratory release of phosphorus into atmosphere

(4) It is sedimentary cycle

22. The rate of decomposition is faster in the ecosystem due to following factors EXCEPT:- **(NEET-2020 COVID19)**

(1) Detritus rich in sugars (2) Warm and moist environment

(3) Presence of aerobic soil microbes (4) Detritus richer in lignin and chitin

23. Which of the following ecological pyramids is generally inverted? **(NEET-2020 COVID19)**

(1) Pyramid of numbers in grassland (2) Pyramid of energy

(3) Pyramid of biomass in a forest (4) Pyramid of biomass in a sea

24. In relation to Gross primary productivity and Net primary productivity of an ecosystem, which one of the following statements is correct? **(NEET-2020)**

1) There is no relationship between Gross primary productivity and Net primary productivity
2) Gross primary productivity is always less than net primary productivity
3) Gross primary productivity is always more than net primary productivity
4) Gross primary productivity and Net primary productivity are one and same

25. Mach the trophic levels with their correct species examples in grassland ecosystem **(NEET-2020)**

| | |
|---|---|
| (a) Fourth trophic level | (i) Crow |
| (b) Second trophic level | (ii) Vulture |
| (c) First trophic level | (iii) Rabbit |
| (d) Third trophic level | (iv) Grass |

Select the correct option

| | (a) | (b) | (c) | (d) |
|---|---|---|---|---|
| 1) | (i) | (ii) | (iii) | (iv) |
| 2) | (ii) | (iii) | (iv) | (i) |
| 3) | (iii) | (ii) | (i) | (iv) |
| 4) | (iv) | (iii) | (ii) | (i) |

26. Which of the following statements is incorrect? **(NEET-2020)**
(1) Biomass decreases from first to fourth trophic level
(2) Energy content gradually increases from first to fourth trophic level
(3) Number of individuals decreases from first trophic level to fourth trophic level
(4) Energy content gradually decreases from first to fourth trophic level

27. Which of the following statements is incorrect regarding the phosphorus cycle? **(NEET-2020)**
(1) Phosphates are the major form of phosphorus reservoir
(2) Phosphorus solubilising bacteria facilitate the release of phosphorus from organic remains
(3) There is appreciable respiratory release of phosphorus into atmosphere
(4) It is sedimentary cycle

28. The amount of nutrients such as carbon, nitrogen, phosphorus and calcium present in the soil at any given time, is referred as: [NEET-2021]

1) Climax community 2) Standing state 3) Standing crop 4) Climax

29. In the equation GPP-R=NPP R represents: [NEET-2021]

1) Retardation factor 2) Environment factor 3) Respiration losses 4) Radiant energy

30. Which of the following statement is not correct? [NEET-2021]

1) Pyramid of biomass in sea is generally upright

2) Pyramid of energy is always upright

3) Pyramid of numbers in a grassland ecosystem is up right

4) Pyramid of biomass in sea is generally inverted

31. Given below are two statements. **[NEET-2022]**
Statement I : Decomposition is a process in which the detritus is degraded into simpler substances by microbes .
Statement II : Decomposition is faster if the detritus is rich in lignin and chitin
In the light of the above statements, choose the correct answer from the options given below:
1) Both statement I and statement II are correct
2) Both statement I and Statement II are incorrect
3) Statement I is correct but statement II is incorrect
4) Statement I is incorrect but statement II is correct

32. Which one of the following will accelerate phosphorus cycle? **[NEET-2022]**
1) Burning of fossil fuels 2) Volcanic activity
3) Weathering of rocks 4) Rain fall and storms

33. Detritivores breakdown detritus into smaller particles. This process is called: **[NEET-2022]**

1) Catabolism
2) Fragmentation
3) Humification
4) Decomposition

**34.** In an ecosystem if the Net Primary Productivity (NPP) of first trophic level is $100x(\text{kcalm}^{-2})\text{yrr}^{-1}$, what would be the GPP (Gross Primary Productivity) of the third trophic level of the same ecosystem?

(a) $\frac{x}{10}(\text{kcalm}^{-2})\text{yr}^{-1}$
(b) $x(\text{kcalm}^{-2})\text{yr}^{-1}$
(c) $10x(\text{kcalm}^{-2})\text{yr}^{-1}$
(d) $\frac{100x}{3x}(\text{kcalm}^{-2})\text{yr}^{-1}$

**[NEET 2024]**

**35.** The species of plants that plays a vital role in controlling the relative abundance of other species in a community is called (a)alien species
(b) endemic species
(c) exotic species
(d) keystone species

**6**

**36.** Identify the correct statements :
A. Detrivores perform fragmentation.
B. The humus is further degraded by some microbes during mineralization.
C. Water soluble inorganic nutrients go down into the soil and get precipitated by a process called leaching.
D. The detritus food chain begins with living organisms.
E. Earthworms break down detritus into smaller particles by a process called catabolism.
Choose the correct answer from the options given below:
(a) B, C, D only
(b) C, D, E only
(c) D, E, A only
(d) A, B, C only

**[NEET 2023]**

**37**. In the equation GPP $-\text{R} = \text{NPP}$
GPP is Gross Primary Productivity
NPP is Net Primary Productivity
$R$ here is .
(a) Respiratory quotient
(b) Respiratory loss
(c) Reproductive allocation
(d) Photosynthetically active radiation

**[NEET 2023]**

**38**.Match List I with List II:

| | List I (Interaction) | | List II (Species A and B) |
|---|---|---|---|
| (A) | Mutualism | (I) | + (A), 0(B) |
| (B) | Commensalism | (II) | -(A), 0(B) |
| (C) | Amensalism | (III) | + (A), -(B) |
| (D) | Parasitism | (IV) | + (A), +(B) |

Choose the correct answer from the options given below:
(a) A-IV, B-I, C-II, D-III
(b) A-IV, B-III, C-I, D-II
(c) A-III, B-I, C-IV, D-II
(d) A-IV, B-II, C-I, D-III

**[NEET 2023]**

**39.** Match List - I with List - II

| | List - I | | List - II |
|---|---|---|---|
| (A) | Hydrarch succession | (I) | Gradual change in the species composition |
| (B) | Xerarch succession | (II) | Faster and climax reached quickly |
| (C) | Ecological succession | (III) | Lichens to mesic conditions |
| (D) | Secondary succession | (IV) | Phytoplankton to mesic conditions |

Choose the correct answer from the options given below :
(a) (A)-(IV), (B)-(II), (C)-(III), (D)-(I)
(b) (A)-(III), (B)-(I), (C)-(IV), (D)-(II)
(c) (A)-(I), (B)-(IV), (C)-(II), (D)-(III)
(d) (A)-(IV), (B)-(III), (C)-(I), (D)-(II)

**[NEET 2023 Manipur]**

**40.** The amount of nutrients such as carbon, nitrogen, potassium and calcium present in the soil at any given time is referred to as :
(a)Standing state
(b) Standing crop
(c) Humus (d) Detritus

**[NEET 2023 Manipur**

**41.** Given below are two statements:
**Statement I:** The primary source of energy in an ecosystem is solar energy.
**Statement II:** The rate of production of organic matter during photosynthesis in an ecosystem is called net primary productivity (NPP).
In the light of the above statements, choose the most appropriate answer from the options given below:
(a) Both statement I and statement II are correct
(b) Both statement I and statement II are incorrect
(c) Statement I is correct but statement II is incorrect
(d) Statement I is incorrect but statement II is correcty

**[NEET 2025]**

**42.** Who is known as the father of Ecology in India?
(a) S. R. Kashyap
(b) Ramdeo Misra
(c) Ram Udar
(d) Birbal Sahni

**[NEET 2025]**

**43.**Which of the following is the unit of productivity of an Ecosystem?
(a) $gm^{-2}$
(b) $KCalm^{-2}$
(c) $KCalm^{-3}$
(d) $(KCalm^{-2})yr^{-1}$

**[NEET 2025]**

**44.**Given below are two statements:
**Statement I:** In ecosystem, there is unidirectional flow of energy of sun from producers to consumers.
**Statement II:** Ecosystems are exempted from 2 $^{nd}$ law of thermodynamics.
In the light of the above statements, choose the most appropriate answer from the options given below:
(a) Both Statement I and Statement II are correct
(b) Both Statement I and Statement II are incorrect
(c) Statement I is correct but Statement II is incorrect
(d) Statement I is incorrect but Statement II is correct

**[NEET 2025]**

## NCERT LINE BY LINE QUESTIONS – ANSWERS

| **Q** | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 |
|---|---|---|---|---|---|---|---|---|---|---|
| **Ans** | **C** | **B** | **D** | **D** | **B** | **A** | **C** | **B** | **D** | **C** |
| **Q** | 11 | 12 | 13 | 14 | 15 | 16 | 17 | 18 | 19 | 20 |
| **Ans** | **B** | **C** | **D** | **C** | **C** | **B** | **C** | **D** | **B** | **D** |
| **Q** | 21 | 22 | 23 | 24 | 25 | 26 | 27 | 28 | 29 | 30 |
| **Ans** | **B** | **B** | **A** | **B** | **B** | **C** | **B** | **D** | **C** | **C** |

| | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| **Q** | 31 | 32 | 33 | 34 | 35 | 36 | 37 | 38 | 39 | 40 |
| **Ans** | **C** | **C** | **A** | **B** | **D** | **A** | **D** | **B** | **C** | **B** |
| **Q** | 41 | 42 | 43 | 44 | 45 | 46 | 47 | 48 | 49 | 50 |
| **Ans** | **C** | **A** | **C** | **B** | **C** | **D** | **D** | **D** | **A** | **D** |
| **Q** | 51 | 52 | 53 | 54 | 55 | 56 | 57 | 58 | 59 | 60 |
| **Ans** | **A** | **C** | **B** | **B** | **B** | **A** | **A** | **B** | **C** | **B** |
| **Q** | 61 | 62 | 63 | 64 | 65 | 66 | 67 | 68 | 69 | 70 |
| **Ans** | **A** | **B** | **B** | **B** | **C** | **B** | **C** | **D** | **D** | **C** |
| **Q** | 71 | 72 | 73 | 74 | 75 | 76 | 77 | 78 | 79 | 80 |
| **Ans** | **C** | **B** | **D** | **B** | **C** | **B** | **D** | **D** | **C** | **D** |
| **Q** | 81 | 82 | 83 | 84 | 85 | 86 | 87 | 88 | 89 | 90 |
| **Ans** | **C** | **D** | **C** | **B** | **B** | **A** | **C** | **C** | **D** | **C** |
| **Q** | 91 | 92 | 93 | 94 | 95 | 96 | 97 | 98 | 99 | 100 |
| **Ans** | **D** | **C** | **D** | **D** | **B** | **D** | **B** | **C** | **C** | **D** |
| **Q** | 101 | | | | | | | | | |
| **Ans** | **A** | | | | | | | | | |

## NEET PREVIOUS YEARS QUESTIONS-ANSWERS

**1** (a) **2** (d) **3** (b) **4** (b) **5** (a) **6** (c) **7** (a) **8** (c) **9** (a) **10** (d)
**11** (a) **12** (a) **13** (c) **14** (d) **15** (d) **16** (d) **17** (a) **18** (c) **19** (4) **20** (2)
**21** (3) **22** (4) **23** (4) **24** (3) **25** (2) **26** (2) **27** (3) **28** (2) **29** (3) **30** (1)
**31** (3) **32** (3) **33** (2) 34(c) 35(d) 36(d) 37(b) 38(a) 39(d) 40(a) 41(c) 42(b) 43(d) 44(c)

## NEET PREVIOUS YEARS QUESTIONS-EXPLANATIONS

**1. (a)** The given data depicts the inverted pyramid of biomass, usually present in aquatic ecosystem. Upright pyramid of biomass and numbers are not possible, as the data depicts primary producer is less than primary consumer and this is less than secondary consumers. Pyramid of energy is always upright.

**2. (d)** Forest ecosystem has the maximum biomass. Some very highly productive ecosystems are :
– Tropical rain forest
– Coral reef
– Estuaries
– Sugarcane fields

**3. (b)** Sir Arthur George Tansley was an English botanist and a pioneer in the science of ecology who coined the term ecosystem.

**4. (b)** Cropland ecosystem is largest anthropogenic ecosystem characterised by less diversity and high productivity.

**5. (a)**

**6. (c)** Detritivores are the organisms which feed on dead plants and animal residues.

**7. (a)**

**8. (c)** Standing crop is the amount of living biomass in an ecosystem. It indicates the productivity & luxuriance of growth. It is expressed in the form of number or biomass of organisms per unit area.
**9. (a)** Gross Primary Productivity (GPP) is the rate of production of biomass or accumulation of energy by green plants per unit area per unit time. GPP depends on the chlorophyll content.
**10. (d)** The gradual and predictable change, in the composition of species takes place in a given area during ecological succession.
**11. (a)** Biotic community is an association of individuals of different species living in the same habitat and showing functional interactions.
**12. (a)** Secondary succession takes place in disturbed area having poor vegetation.
**13. (c)** Detritivores are the organisms which feed on dead plants and animal residues.
**14. (d)** Biomagnification means an increase in concentration of toxins through the trophic levels of a food chain.
**15. (d)** Carbon and Nitrogen are gaseous nutrient cycle. Sulphur and phosphorus are sedimentary nutrient cycle.
**16. (d)** Detrivores, (*e.g.* earthworm) break down detritus into smaller particles. The species that invade a bare area in succession is called pioneer species. The products of ecosystem processes are termed as ecosystem services, *e.g.*, healthy forest ecosystems purify air and water, mitigate droughts and floods etc. Natality refers to number of births during a given period in the population.
**17. (a) 18. (c)**
24. Gross primary productivity of an ecosystem is the rate of production of new organic matter during photosynthesis. Net primary productivity is GPP-respiration. So gross primary productivity is always more than NPP
25. Grassland ecosystem has the following trophic levels
First trophic level– Grass
Second trophic level– Rabbit
Third trophic level– Crow
Fourth trophic level– Vulture
28. Standing sate
29. Gross primary production minus respiration loss of energy is equal to net primary production. So R represents respiratory loss of energy
30. In an aghatic ecosystem the biomass increases from lower trophic levels to higher trophic levels. So the pyramid of biomass in a sea ecosystem in inverted
31. Statement I is correct but statement II is incorrect
Lignin & Chitin are complex chemicals decomposition is slow
32 Weathering of rocks will accelerate the 'P' cycle
33. In fragmentation breakdown of detritus occurs

**34.Ans.(c)**
**Explanation**
NPP at first trophic level would be the GPP for second trophic level. NPP at second trophic level would be GPP for third trophic level. Therefore, $100x(\text{kcal/m}^2/\text{yr})$ would be GPP at second trophic level and $100x \times 10\%(\text{kcal/m}^2/\text{yr})$ i.e., $10x(\text{kcal/m}^2/\text{yr})$ energy would be GPP at third trophic level.

**35.Ans.(d)**
**Explanation**
The correct answer is :
Option d : Keystone species
A keystone species plays a crucial role in maintaining the structure of an ecological community, affecting many other organisms in an ecosystem and helping to determine the types and numbers of various other species in the community. The absence of a keystone species can lead to a significant shift in the ecosystem and a loss of biodiversity.
Exotic species or Alien species are organisms that have been introduced into an area outside their normal distribution.

Endemic species are species that are native to, and only found in, a specific geographical area. This could be an island, a country, or even a particular habitat type. Endemic species often have unique adaptations to their specific environment and may be particularly vulnerable to changes in that environment, including the introduction of exotic species.

**36.Ans. (d)**
**Explanation**
Let's evaluate each statement:
A. Detrivores perform fragmentation.
This statement is true. Detrivores, such as earthworms and beetles, break down detritus (dead organic material) into smaller pieces in a process called fragmentation.
B. The humus is further degraded by some microbes during mineralization. This statement is true. Microbes, including bacteria and fungi, break down humus into inorganic nutrients in a process called mineralization.
C. Water-soluble inorganic nutrients go down into the soil and get precipitated by a process called leaching.
This statement is true. Leaching refers to the process where nutrients are washed away from the soil into lower layers or into bodies of water.
D. The detritus food chain begins with living organisms.
This statement is false. The detritus food chain begins with dead organic material or detritus, not living organisms.
E. Earthworms break down detritus into smaller particles by a process called catabolism.
This statement is false. The process by which earthworms break down detritus into smaller particles is called fragmentation, not catabolism.
Catabolism refers to the breakdown of complex molecules in living organisms to form simpler ones, along with the release of energy.
Therefore, the correct answer is :
Option d : A, B, C only.

**37.Ans. (b)**
**Explanation**
In the equation GPP - R = NPP,
GPP stands for Gross Primary Productivity, NPP stands for Net Primary Productivity, and R represents the energy used by plants for their own metabolic processes, which is also known as Respiratory loss

**38.Ans.(a)**
**Explanation**
$(+,+)$ Mutualism : In this interaction, both the interacting species are benefitted.
$(+,0)$ Commensalism : Only one species is benefitted and the other species remains unharmed.
$(-,0)$ Amensalism : Neither species is benefitted. One remains unharmed and the other is harmed.
$(+,-)$ Parasitism : One species is benefitted and other is negatively effected.

**39.Ans.(d)**
**Explanation**
The correct answer is :
Option d : (A)-(IV), (B)-(III), (C)-(I), (D)-(II)
Explanation:
(A) Hydrarch succession - (IV) Phytoplankton to mesic conditions. Hydrarch succession occurs in wet or aquatic areas, starting from an aquatic stage like phytoplankton and gradually moving towards mesic conditions, where the environment is neither too wet nor too dry.
(B) Xerarch succession - (III) Lichens to mesic conditions. Xerarch succession occurs in dry areas, such as deserts or rocks, and typically begins with organisms like lichens, gradually moving towards mesic conditions.
(C) Ecological succession - (I) Gradual change in the species composition. Ecological succession is the process by which the structure of a biological community evolves over time, involving a gradual change in species composition.

(D) Secondary succession - (II) Faster and climax reached quickly. Secondary succession refers to the series of community changes that occur on a preexisting, disrupted habitat and is typically faster than primary succession with the climax being reached more quickly because it begins on soil and not bare rock.

**40.Ans.(a)**
**Explanation**
Option a : Standing state
Explanation : "Standing state" is a term used in ecology to denote the amount of nutrients such as carbon, nitrogen, potassium, calcium, etc., present in the soil at any given time. It provides an estimate of the availability of these nutrients in the ecosystem.
On the other hand, "Standing crop" is a term used to describe the total biomass (the mass of living biological organisms) of an organism in a particular area or volume at a specific time.
"Humus" refers to the organic component of soil, formed by the decomposition of leaves and other plant material by soil microorganisms.
"Detritus" is dead particulate organic material. It typically includes the bodies or fragments of dead organisms, as well as fecal material. Detritus is typically colonized by communities of microorganisms which act to decompose it.

**41.**Ans**.(c)**

**Explanation**

Statement I is correct- Solar energy is the primary source of energy in an ecosystem. Statement II is incorrect- The rate of production of organic matter during photosynthesis is gross primary productivity.

**42**.Ans**.(b)**

**Explanation**

Ramdeo Misra is regarded as the Father of Ecology in India for his pioneering work in the field of ecology and environmental science, especially ecosystem analysis and conservation biology.

**43.**Ans**.(d)**

**Explanation**

Productivity is expressed in terms of $gm^{-2}yr^{-1}$ or ( $kcalm^{-2}$ ) $yr^{-1}$.

**44.**Ans**.(c)**

**Explanation**

Ecosystems are not exempt from the Second Law of thermodynamics. They need a constant supply of energy to synthesise the molecules they require, to counteract the universal tendency toward increasing disorderliness.

## About us

BioResire (NEET | CSIR NET | Biotech Internships) is a life sciences research and training organization dedicated to bridging the gap between academic learning and industry skills. We provide internships, projects, and programs in Bioinformatics, Biotechnology, Molecular Biology, Cancer Research, Neuroscience, and related fields, helping students build job-oriented scientific careers.

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