36
Ecosystem

TOPIC 1
Ecosystem and its Components

01 Which one of the following processes during decomposition is correctly described? **[NEET 2013]**

(a) Fragmentation-Carried out by organisms such as earthworm
(b) Humification-Leads to the accumulation of a dark coloured substance humus, which undergoes microbial action at a very fast rate
(c) Catabolism-Last step in the decomposition under fully anaerobic condition
(d) Leaching-Water soluble inorganic nutrients rise to the top layers of soil

Ans. *(a)*

Fragmentation is one of the steps during decomposition, in which detritus is converted into small fragments. Humification leads to dark coloured amorphous substance called humus that is highly resistent to microbial action and undergoes decomposition at an extremely slow rate. Catabolism is the set of metabolic pathways that breaks down molecules into smaller units to release energy. Leaching refers to the loss of water soluble plant nutrients from the soil due to the rain and irrigation.

02 Which ecosystem has the maximum biomass? **[NEET 2017]**

(a) Forest ecosystem
(b) Grassland ecosystem
(c) Pond ecosystem
(d) Lake ecosystem

Ans. *(a)*

Biomass refers to the amount of living organic matter. Forest ecosystem have the maximum biomass, because it includes organisms of all trophic levels as compared to pond, lake or grassland ecosystem. In forest ecosystems productivity is also high that contributes to maximum biomass.

03 Presence of plants arranged into well defined vertical layers depending on their height can best seen best in **[NEET 2017]**

(a) tropical savannah
(b) tropical rain forest
(c) grassland
(d) temperate forest

Ans. *(b)*

Tropical rain forests show stratification. It can be defined as the grouping of plants into two or more well defined layers depending upon their height. These layers are called strata or storeys. There storeys consist of respectively very tall emergent trees, tall trees, small trees, a shrub layer and a ground layer of ferns, mosses and herbs.

04 The term ecosystem was coined by **[NEET 2016, Phase I]**

(a) AG Tansley
(b) E Haeckel
(c) E Warming
(d) EP Odum

Ans. *(a)*

The term ecosystem was coined by AG Tansley in 1935. Ecosystem is a self regulated and self sustaining structural and functional unit of nature. It consists of living beings and their physical environment.

05 Which one of the following is a characteristic feature of cropland ecosystem? **[NEET 2016, Phase II]**

(a) Least genetic diversity
(b) The absence of weeds
(c) Ecological succession
(d) The absence of soil organisms

Ans. *(a)*

Cropland ecosystem is largest anthropogenic ecosystem characterised by less diversity and high productivity.

06 The primary producers of the deep-sea hydrothermal vent ecosystem are **[NEET 2016, Phase II]**

(a) green algae
(b) chemosynthetic bacteria
(c) blue-green algae
(d) coral reefs

Ans. *(b)*

The primary producers of the deep-sea hydrothermal vent ecosystem are **archaebacteria.**

These have chemosynthetic mode of nutrition. Thus option (b), i.e. chemosynthetic bacteria is the correct option.

07 Which one of the following is not a functional unit of an ecosystem? **[CBSE AIPMT 2012]**

(a) Energy flow (b) Decomposition
(c) Productivity (d) Stratification

Ans. *(d)*

Stratification is not the functional unit of ecosystem. Vertical distribution of different species occupying different levels is called stratification. It represent the structural unit of an ecosystem. For example, trees occupy top vertical strata or layer of a forest, shrubs the second and herbs and grasses occupy the bottom layers.

08 *Quercus* species are the dominant component in **[CBSE AIPMT 2008]**

(a) temperature deciduous forests
(b) alpine forests
(c) scrub forests
(d) tropical rain forests

Ans. *(a)*

Temperate deciduous forests grow in continental climates with summer rainfall and severe winters. They are dominated by broad leaved deciduous trees like *Quercus virginiana*, magnolias, bays and hallies as well as such tropical species as *Ficus aurea* and *Lysiloma*.

09 The slow rate of decomposition of fallen logs in nature is due to their **[CBSE AIPMT 2008]**

(a) low moisture content
(b) poor nitrogen content
(c) anaerobic environment around them
(d) low cellulose content

Ans. *(a)*

The slow rate of decomposition of fallen logs in nature is due to their low moisture content.

The cellulose is in high amount in fallen logs.

The environment arround the fallen logs is aerobic, i.e. O_2 is present.

10 An ecosystem which can be easily damaged but can recover after some time if damaging effect stops, will be having **[CBSE AIPMT 2004]**

(a) low stability and high resilience
(b) high stability and low resilience
(c) low stability and low resilience
(d) high stability and high resilience

Ans. *(a)*

Stability is the power of a system to be in their state against unfavourable factor. Resilience is the capability of regaining its original shape or position after being deformed. Hence, it has low stability and high resilience.

11 Which of the following is the most stable ecosystem? **[CBSE AIPMT 1995]**

(a) Forest
(b) Desert
(c) Mountain
(d) Ocean

Ans. *(d)*

Oceanic biome or ecosystem occupies more than two-thirds of the earth's surface. This is the most stable ecosystem.

12 What is true of ecosystem? **[CBSE AIPMT 1998]**

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

Ans. *(c)*

In an ecosystem producers (green plants) are always more than primary consumers (herbivores).

13 In an ecosystem, which one shows one-way passage **[CBSE AIPMT 1998]**

(a) free energy (b) carbon
(c) nitrogen (d) potassium

Ans. *(a)*

The flow of energy in any ecosystem is unidirectional. The only source of energy is sunlight. It gets trapped by producers then it flows from herbivores to carnivores or consumers at different trophic level.

14 Decomposers are organisms that **[CBSE AIPMT 1994]**

(a) Elaborate chemical substances, causing death of tissues
(b) operate in living body and simplifying organic substances of cells step by step
(c) attack and kill plants as well as animals
(d) operate in relay terms, simplifying step by step the organic constituents of dead body

Ans. *(d)*

Decomposers are the organisms, normally a fungus or bacterium, that digest organic material by secreting digestive enzymes into the environment, in the process liberating nutrients into the environment. These are also known as microconsumers, reducers or scavengers, as converting complex organic constituents of dead bodies of plants, animals, human wastes into simple soluble forms.

TOPIC 2
Productivity and Energy Flow

15 In the equation GPP – R = NPP, R represents **[NEET 2021]**

(a) radiant energy
(b) retardation factor
(c) environment factor
(d) respiration losses

Ans. *(d)*

Net primary productivity is the available biomass for the consumption to heterotrophs. Gross primary productivity is the rate of production of organic matter during photosynthesis. The overall productivity of a system can be found in an equation, where the Net Primary Productivity or NPP, is equal to the Gross Primary Productivity or GPP, minus the Carbon respiration (respiration losses) or R.
The formula is the NPP = GPP – R.

16 The rate of decomposition is faster in the ecosystem due to following factors except **[NEET (Oct.) 2020]**

(a) detritus rich in sugars
(b) warm and moist environment
(c) presence of aerobic soil microbes
(d) detritus richer in lignin and chitin

Ans. *(d)*

The rate of decomposition is faster in the ecosystem if detritus is rich in nitrogen and water soluble substances like sugars. Warm and moist environment also favour decomposition like wise high temperature and presence of aerobic soil microbes also helps in decomposition. But if detritus is rich in lignin and chitin decomposition rate gets slower. Thus, option (d) is correct.

17 Which of the following statements is incorrect? **[NEET (Oct.) 2020]**

(a) Biomass decreases from first to fourth trophic level
(b) Energy content gradually increases from first to fourth trophic level
(c) Number of individuals decreases from first trophic level to fourth trophic level
(d) Energy content gradually decreases from first to fourth trophic level

Ans. *(b)*

Statement (b) is incorrect. It can be corrected as The energy content decreases from the first (producer) to fourth (consumer) level. At each level about 90% of energy is lost and only 10% is passed to next level.

18 Match the trophic levels with their correct species examples in grassland ecosystem.

[NEET (Sep.) 2020]

	Column I		Column II
A.	Fourth trophic level	1.	Crow
B.	Second trophic level	2.	Vulture
C.	First trophic level	3.	Rabbit
D.	Third trophic level	4.	Grass

Select the correct option.

	A	B	C	D
(a)	3	2	1	4
(b)	4	3	2	1
(c)	1	2	3	4
(d)	2	3	4	1

Ans. *(d)*

The correct match is option (d) as in grassland ecosystem grass is the producer (Ist Trophic level). Rabbit is the primary consumer (IInd Trophic level). Crow is secondary consumer (IIIrd Trophic level). Vulture is tertiary consumer (IVth Trophic level). The primary consumers eat the producers. Secondary consumers eat the primary consumers, and so on. Grassland ecosystem is a terrestrial ecosystem. It includes various trophic levels.

Grass → Rabbit → Crow → Vulture

19 In relation to gross primary productivity and net primary productivity of an ecosystem, which one of the following statements is correct?

[NEET (Sep.) 2020]

(a) Gross primary productivity is always more than net primary productivity

(b) Gross primary productivity and net primary productivity are one and same

(c) There is no relationship between gross primary productivity and net primary productivity

(d) Gross primary productivity is always less than net primary productivity

Ans. *(a)*

Gross primary productivity of an ecosystem is the rate of production of organic matter during photosynthesis. Net primary productivity is GPP – respiration. Hence, gross primary productivity is always more than NPP.

20 Most animals that in deep oceanic water are **[CBSE AIPMT 2015]**

(a) primary consumers

(b) secondary consumers

(c) tertiary consumers

(d) detritivores

Ans. *(d)*

Most animals that live in deep oceanic waters and called benthos are scavengers or **detritivores**. These organisms include crustaceans, polychaetes and some microorganisms.

21 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?

Plant → Mice → Snake → Peacock

[CBSE AIPMT 2014]

(a) 0.02 J (b) 0.002 J

(c) 0.2 J (d) 0.0002 J

Ans. *(c)*

According to 10% law of energy flow by Raynold Lindeman. The total amount of energy that can be transferred to the next trophic level is the 10% hence, peacock will receive 0.02 J of energy as top consumer.

Energy received by other organisms are

Plant → 20 J

Mice → $20 \times 10\% = 2$ J

Snake → $2 \times 10\% = 0.2$ J

22 Secondary productivity is rate of formation of new organic matter by **[NEET 2013]**

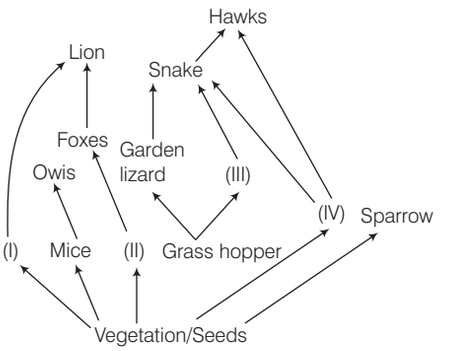
(a) producer (b) parasite

(c) consumer (d) decomposer

Ans. *(c)*

Secondary productivity is the rate of formation of new organic matter by consumers. Primary productivity depends on the producers inhabiting a particular area. Decomposers breakdown complex organic matter into inorganic substances like carbon dioxide, water and nutrients. Parasitic species feed on the body of other organism.

23 Identify the likely orgnaisms I, II, III and IV in the food web shown below. **[CBSE AIPMT 2012]**



	I	II	III	IV
(a)	Deer	Rabbit	Frog	Rat
(b)	Dog	Squirrel	Bat	Deer
(c)	Rat	Dog	Tortoise	Crow
(d)	Squirrel	Cat	Rat	Pigeon

Ans. *(a)*

In the given food web option (a) is correct as producers utilise the radiant energy of sun which is transformed to chemical form during photosynthesis. Thus, green plants occupy the first trophic level. The herbivores constitute the secondary trophic level and the carnivores the third trophic level. Deer is herbivores, rabbit and rat are also herbivores but frog eats the grasshoppers. Also deer is been eaten by lion.

24 Identify the possible link 'A' in the following food chain

[CBSE AIPMT 2012]

Plant → Insect → Frog → 'A' → Eagle

(a) Rabbit (b) Wolf

(c) Cobra (d) Parrot

Ans. *(c)*

The given food chain should be Plant → Insect → Frog → Cobra → Eagle

25 Mass of living matter at a trophic level in an area at any time is called **[CBSE AIPMT 2011]**

(a) standing crop

(b) detritus

(c) humus

(d) standing state

Ans. *(a)*

Standing crop is the total amount of living matter in a specified population at a particular time, expressed as biomass (standing biomass) or its equivalent in terms of energy. The standing crop may vary at different times of the year for example in a population of deciduous trees between summer and winter.

26 Of the total incident solar radiation the proportion of PAR is **[CBSE AIPMT 2011]**

(a) about 70% (b) about 60%
(c) less than 50% (d) more than 80%

Ans. *(c)*

The source of energy in all ecosystem is solar energy. About 50% of the solar energy incident over earth is present in PAR (Photosynthetically active Radiation). About 1-5% of incident solar radiation or 2-10% of PAR is captured by the photosynthetic organisms in the synthesis of organic matter (gross primary productivity).

Roughly 20% of it is consumed in respiration so that net capture of energy (net primary productivity) is 0.8-4% of incident radiation or 1.6-8% of PAR.

27 The biomass available for consumption by the herbivores and the decomposers is called **[CBSE AIPMT 2010]**

(a) net primary productivity
(b) secondary productivity
(c) standing crop
(d) gross primary productivity

Ans. *(a)*

Net primary productivity is equal to the rate of organic matter created by photosynthesis minus the rate of respiration and other losses. It is the biomass available for consumption by the herbivores and the decomposers.

28 The correct sequence of plants in a hydrosere is **[CBSE AIPMT 2009]**

(a) Oak → *Lantana* → *Scirpus* → *Pistia* → *Hydrilla* → *Volvox*
(b) *Volvox* → *Hydrilla* → *Pistia* → *Scirpus* → *Lantana* → Oak
(c) Pistia → *Volvox* → *Scirpus* → *Hydrilla* → Oak → *Lantana*
(d) Oak → *Lantana* → *Volvox* → *Hydrilla* → *Pistia* → *Scirpus*

Ans. *(b)*

The various stages in a hydrosere are well studied in ponds, pools or lakes. The various stages of hydrosere are:

(i) **Phytoplankton stage**, e.g. some blue-green algae, green algae (*Volvox*), diatoms and bacteria, etc.
(ii) **Rooted submerged stage,** e.g. *Hydrilla*, *Vallisneria*, etc.
(iii) **Floating stage,** e.g. *Nelumbo, Nymphaea*, etc. Some free floating species are *Pistia, Azolla*, *Lemna*, etc.
(iv) **Red-swamp stage**, e.g. species of *Scirpus*, *Typha*, etc.
(v) **Sedge-meadow stage,** e.g. species of Cyperaceae and Gramineae.
(vi) **Woodland stage,** e.g. *Lantana, Salix, Populus*, etc.
(vii) **Forest stage,** e.g. Tropical rain forests, mixed forests of *Almus, Acer, Quercus* (oak), tropical deciduous forests.

29 Which one of the following types of organisms occupy more than one trophic level in a pond ecosystem? **[CBSE AIPMT 2009]**

(a) Phytoplankton (b) Fish
(c) Zooplankton (d) Frog

Ans. *(b)*

In a pond ecosystem, fishes occupy more than one trophic levels. Small fishes act as secondary consumer. They feed on primary consumer. Large fishes act as Tertiary consumer. They feed on smaller fish.

30 Consider the following statements concerning food chains. **[CBSE AIPMT 2008]**

I. Removal of 80% tigers from an area resulted in greatly increased growth of vegetation
II. Removal of most of the carnivores resulted in an increased population of deers
III. The length of food chains is generally limited to 3-4 trophic levels due to energy loss
IV. The length of food chains may vary from 2 to 8 trophic levels

Which of the two above statements are correct?

(a) I and II (b) II and III
(c) III aqnd IV (d) I and IV

Ans. *(a)*

Statements II and III are correct. A simple food chain consists of producers, herbivores and carnivores. The length of food chain is generally limited to 3–4 trophic levels due to the energy loss. In grazing food chain the producers (i.e. plants) are eaten by herbivores (i.e. rabbit, deer, cow, etc) and the herbivores are eaten by carnivores. Therefore, the removal of most of the carnivores resulted in an increased population of deers.

31 Which of the following ecosystem types has the highest annual net primary productivity? **[CBSE AIPMT 2007]**

(a) Tropical rain forest
(b) Tropical deciduous forest
(c) Temperate evergreen forest
(d) Temperate deciduous forest

Ans. *(a)*

Productivity of tropical rain forest is highest. The tropical rain forest cover 300,000 km^2 area. They contain more than 50% of total flora and fauna of the world.

32 Which of the following is expected to have the highest value (gm /m^2 /yr) in a grassland ecosystem? **[CBSE AIPMT 2004]**

(a) Secondary Production (SP)
(b) Tertiary Production (TP)
(c) Gross Production (GP)
(d) Net Production (NP)

Ans. *(c)*

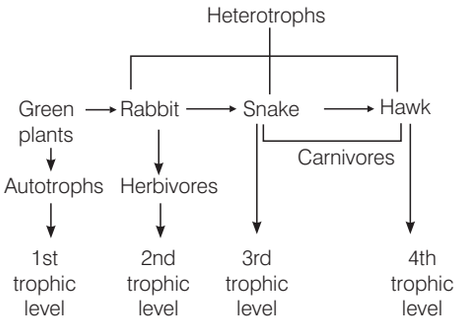
The rate of total capture of energy or the rate of total production of organic material is gross primary productivity while the balance or biomass remaining after meeting the cost of respiration of producers is net primary productivity. Hence, gross productivity has highest value in grassland ecosystem.

33 Bamboo plant is growing in a far forest then what will be the trophic level of it? **[CBSE AIPMT 2002]**

(a) First trophic level (T_1)
(b) Second trophic level (T_2)
(c) Third trophic level (T_3)
(d) Fourth trophic level (T_4)

Ans. *(a)*

Plants, being photosynthetic, occupy first trophic level (T_1) in the food chain.



A trophic level is a step in the flow of energy through an ecosystem, such as the step at which plants manufacture food or the step at which carnivores feed on other animals.

34 The transfer of energy from one trophic level to another is governed by the 2nd law of thermodynamics. The average efficiency of energy transfer from herbivores to carnivores is **[CBSE AIPMT 1999, 96]**

(a) 5% (b) 10%
(c) 25% (d) 50%

Ans. *(b)*

According to 10% law of **Lindeman**, only 10% of energy is transferred from one trophic level to another, i.e. from herbivores to carnivores.

35 The rate at which light energy is converted into chemical energy of organic molecules is the ecosystem's **[CBSE AIPMT 1998]**

(a) net primary productivity
(b) gross secondary productivity
(c) net secondary productivity
(d) gross primary productivity

Ans. *(d)*

Plants, found in an ecosystem are known as producers, because they can prepare food for themself by the process of photosynthesis. The energy fixed by the autotrophs during photosynthesis gets incorporated into organic compounds. The rate at which organic molecules are formed in a green plant (or a population of green plants) is called gross primary productivity.

36 Which of the following ecosystem has the highest gross primary productivity? **[CBSE AIPMT 1997]**

(a) Grasslands
(b) Coral reefs
(c) Mangroves
(d) Equatorial rain forest

Ans. *(b)*

The **Gross primary productivity** of an ecosystem is the total amount of organic matter produced by it's producers, i.e. autotrophs. Coral reefs have maximum and deserts have lowest productivity.

37 In a biotic community, the primary consumers are **[CBSE AIPMT 1995]**

(a) carnivores (b) omnivores
(c) detritivores (d) herbivores

Ans. *(d)*

In a biotic community, the primary consumers or first order consumers are herbivores, they feed on producers. They are also called **key industry animals** because they convert plant material into animal material, e.g. rat, deer, rabbit, cattle, goat, sheep, insects etc.

38 If we completely remove the decomposers from an ecosystem, its functioning will be adversely affected, because **[CBSE AIPMT 1995]**

(a) energy flow will be blocked
(b) herbivores will not receive solar energy
(c) mineral movement will be blocked
(d) rate of decomposition will be very high

Ans. *(c)*

Decomposers like fungi, bacteria and Actinomycetes are also called mineralisers as they release minerals trapped in organic matter. Thus, they help in recycling of minerals, so if we completely remove decomposers the mineral movement will be blocked.

39 In grass-deer-tiger food chain, grass biogass is one tonne. The tiger biomass shall be **[CBSE AIPMT 1994]**

(a) 100 kg (b) 10 kg
(c) 200 kg (d) 1 kg

Ans. *(b)*

According to 10% law of **Lindemann,** if 1 tonne (1000 kg) biomass is present in grass, only 10% of it means 100 kg will go into deer and in tiger the biomass will be only 10 kg, i.e. 10% of deer's biomass.

40 Second most important trophic level in a lake is **[CBSE AIPMT 1994]**

(a) zooplankton (b) phytoplankton
(c) benthos (d) neuston

Ans. *(a)*

In a lake ecosystem, the first trophic level is occupied by phytoplankton and then in second trophic level there are zooplanktons which are primary consumers.

41 Food chain in which microorganisms breakdown the food formed by primary producers are **[CBSE AIPMT 1991]**

(a) parasitic food chain
(b) detritus food chain
(c) consumer food chain
(d) predator food chain

Ans. *(b)*

Detritus food chain goes from dead organic matter to detritivores protozoan, bacteria, fungi and then to organisms feeding on detritivores, e.g. insect larva, nematodes. This food chain is also called as saprophytic food chain.

42 Pick up the correct food chain. **[CBSE AIPMT 1991]**

(a) Grass → *Chameleon* → Insect → Bird
(b) Grass → Fox → Rabbit → Bird
(c) Phytoplankton → Zooplankton → Fish
(d) Fallen leaves → Bacteria → Insect larvae

Ans. *(c)*

The correct food chain is:

Phytoplankton → Zooplankton → Fish

i.e. Producers → Primary consumer → Secondary consumer

43 Upper part of sea/aquatic ecosystem contains **[CBSE AIPMT 1998]**

(a) plankton (b) nekton
(c) Both (a) and (b) (d) benthos

Ans. *(a)*

Planktons are passively floating organisms living in the surface layers of water due to absence of locomotory organs, they are of two types: Phytoplankton (photosynthetic plankton) and zooplankton.

While nektons are actively floating organisms and benthos are found in the bottom and are usually sessile.

TOPIC 3
Ecological Pyramids and Succession

44 Which of the following statement is not correct? **[NEET 2021]**

(a) Pyramid of biomass in sea is generally inverted

(b) Pyramid of biomass in sea is generally upright

(c) Pyramid of energy is always upright

(d) Pyramid of numbers in a grassland ecosystem is upright

Ans. *(b)*

Pyramid of biomass in a sea is generally inverted because the primary producers (phytoplanktons) have a lower biomass than that of succeeding zooplanktons, which further have a lower biomass than that of succeeding small fishes and so on.

Pyramid of energy is the only pyramid that can never be inverted and is always upright. This is because some amount of energy in the form of heat is always lost to the environment at every trophic level of the food chain.

In a grassland ecosystem, the number of producers is always maximum, followed by reducing number of organisms at second trophic level, third trophic level and other higher level (if present). Thus, the pyramid of number in grassland is upright.

45 Which of the following ecological pyramids is generally inverted? **[NEET (National) 2019]**

(a) Pyramid of energy

(b) Pyramid of biomass in a forest

(c) Pyramid of biomass in a sea

(d) Pyramid of numbers in grassland

Ans. *(c)*

Pyramid of biomass in sea is generally inverted because the biomass of a trophic level depends upon reproductive potential and longevity of its members.

In a sea, the biomass of phytoplanktons is usually lesser than that of zooplanktons while the biomass of carnivores is greater than small carnivores and zooplanktons. On the other hand, pyramid of energy is always upright. Pyramid of biomass in terrestrial ecosystems (forests, grasslands) is also upright.

46 What type of ecological pyramid would be obtained with the following data?

Secondary consumer : 120 g
Primary consumer : 60 g
Primary producer : 10 g **[NEET 2018]**

(a) Upright pyramid of numbers

(b) Pyramid of energy

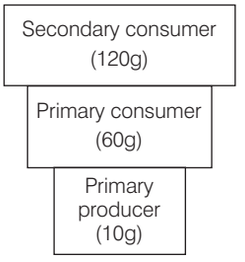
(c) Inverted pyramid of biomass

(d) Upright pyramid of biomass

Ans. *(c)*

An inverted pyramid of biomass will be obtained from the given data. The biomass is continuously decreasing from secondary consumer (120 g) to primary consumer (60 g) to primary producer (10 g).

Therefore, upright pyramid of biomass cannot be obtained. The data is given in the form of biomass, therefore pyramid of number and energy cannot be obtained. Further, pyramid of energy is always upright.



Inverted pyramid of biomass

47 During ecological succession **[CBSE AIPMT 2015]**

(a) the gradual and predictable change in species composition occurs in a given area

(b) the establishment of a new biotic community is very fast in its primary phase

(c) the numbers and types of animals remain constant

(d) the changes lead to a community that is in near equilibrium with the environment and is called pioneer community

Ans. *(a)*

The gradual and fairly predictable change in the species composition of a given area is called ecological succession. During succession some species colonise an area and their populations become more numerous, whereas populations of other species decline and even disappear.

48 Match the following and select the correct option. **[CBSE AIPMT 2014]**

	Column I		Column II
A.	Earthworm	1.	Pioneer species
B.	Succession	2.	Detritivore
C.	Ecosystem service	3.	Natality
D.	Population growth	4.	Pollination

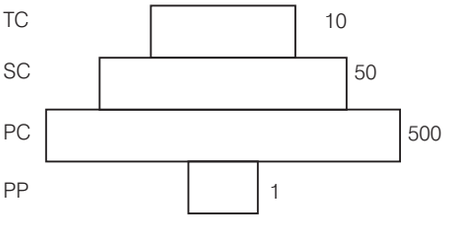
Codes

	A	B	C	D		A	B	C	D
(a)	1	2	3	4	(b)	4	1	3	2
(c)	3	2	4	1	(d)	2	1	4	3

Ans. *(d)*

The species that invade a base area in succession is called pioneer species and earthworm is a detritivore. Ecosystem services are the products of ecosystem process, e.g. biodiversity maintenance, crop pollination, etc. and natality is the term used for population growth or birth rate in population ecology.

49 Given below is an imaginary pyramid of numbers. What could be one of the possibilities about certain organisms at some of the different levels? **[CBSE AIPMT 2012]**



(a) Level PC is insects and level SC is small insectivorous birds

(b) Level PP is phytoplanktons in sea and Whale on top level TC

(c) Level one PP is pipal trees and the level SC is sheep
(d) Level PC is rats and level SC is cats

Ans. *(a)*

The given figure shows spindle-shaped pyramid of number in single tree ecosystem. Here, a single large sized tree provides food to a large number of herbivores which support a few carnivores and the later are eaten by small number of top carnivores. So, here PP is used for producer, i.e. single tree, PC is Primary Consumers, i.e. large number of insects, SC is Secondary Consumers, i.e. small insectivorous birds and TC is Top Consumers which may be eagles or falcon, etc.

50 The upright pyramid of number is absent in **[CBSE AIPMT 2012]**

(a) pond
(b) forest
(c) lake
(d) grassland

Ans. *(b)*

Pyramid of number represents the number of individuals per unit area at various trophic levels. It is always upright in grassland, pond and lake ecosystems. But in forest or single tree ecosystem, it is spindle-shaped and of parasitic food chain is considered then it will be an inverted pyramid.

51 The second stage of hydrosere is occupied by plants like **[CBSE AIPMT 2012]**

(a) *Azolla*
(b) *Typha*
(c) *Salix*
(d) *Vallisneria*

Ans. *(d)*

Vallisneria is at second stage of hydrosere. It starts orginating in a pond with colonisation of some phytoplanktons which forms the pioneer plant community. The stages are

Ist - Bacteria, blue-green algae and algae

IInd- *Hydrilla*, *Potamogeton* and *Vallisneria*

IIIrd- *Nelumbo*, *Nymphaea*, *Trapa*, *Azolla* and *Wolffia*

IVth - *Typha* and *Sagitaria*

Vth- *Juncus* and *Cyperus*

VIth- *Salix* and *Populus*, *Almus*.

52 Which one of the following statements is correct for secondary succession? **[CBSE AIPMT 2011]**

(a) It occurs on a deforested site
(b) It follows primary succession
(c) It is similar to primary succession except that it has a relatively fast pace
(d) It begins on a bare rock

Ans. *(a)*

Secondary succession of subsere is ecological succession that takes place in a recently denuded area which still contains a lot of organic debris, remains and propagules of previous living organisms. It is more common and caused by baring of an area due to the forest fires, deforestation, excessive overgrazing, landslides, earthquakes, repeated floods, etc.

53 Which one of the following statements for pyramid of energy is incorrect whereas the remaining three are correct? **[CBSE AIPMT 2011]**

(a) It show energy content of different trophic level of organisms
(b) It is inverted in shape
(c) It is upright in shape
(d) Its base is broad

Ans. *(b)*

Pyramid of energy is graphic representation of energy per unit area sequence-wise in various rising trophic levels with producers at the base and top carnivores at the apex. Pyramid of energy is upright in all cases. It is also more accurate than other types of ecological pyramids.

54 Which one of the following is not used for constructing of ecological pyramids? **[CBSE AIPMT 2006]**

(a) Dry weight
(b) Number of individuals
(c) Rate of energy flow
(d) Fresh weight

Ans. *(d)*

Ecological pyramids are the graphical representation of the trophic structure and function at successive trophic levels. Ecological pyramids are of three general types, listed as here under:

(a) **Pyramid of numbers**, showing the number of organisms at each level.
(b) **Pyramid of biomass**, showing the total dry weight of living matter.
(c) **Pyramid of energy**, showing the rate of energy flow/productivity at successive trophic levels.

Thus, fresh weight is not used for the construction of ecological pyramids.

55 The greatest biomass of autotrophs in the world's oceans is that of **[CBSE AIPMT 2000]**

(a) benthic brown algae, coastal red algae and dephnids
(b) benthic diatoms and marine viruses
(c) sea grasses and slime molds
(d) free-floating micro-algae, cyanobaceria and nanoplankton

Ans. *(d)*

The greatest biomass of autotrophs in the world's ocean is that of free floating micro-algae, cyanobacteria and nanoplankton. Phytoplanktons, diatoms and dinoflagellates are the dominant producers in the world's oceans.

56 In a terrestrial ecosystem such as forest, maximum energy is in which trophic level? **[CBSE AIPMT 1998]**

(a) T_1 (b) T_2
(c) T_3 (d) T_4

Ans. *(a)*

There is 90% loss of energy at every trophic level. Therefore, maximum energy is at T_1 level.

57 In a food chain, the largest population is that of **[CBSE AIPMT 1996, 1994]**

(a) decomposers
(b) producers
(c) primary consumers
(d) tertiary consumers

Ans. *(b)*

Producers are present in largest number in any food chain.

58 The nature of climax community ultimately depends on **[CBSE AIPMT 1996]**

(a) climate
(b) bed rock
(c) soil organisms
(d) pool of available nutrients

Ans. *(a)*

The climax community ultimately depends on the climate such as rain forest in moist tropical area and mixed coniferous or deciduous forest in temperate area.

59 The primary succession refers to the development of communities on a **[CBSE AIPMT 1995]**

(a) fleshly cleared crop field
(b) forest clearing after devastating fire
(c) pond, freshly filled with water after a dry phase
(d) newly-exposed habitat with no record of earlier vegetation

Ans. *(d)*

Primary succession is the succession in a totally barren area with no record of earlier vegetation. It takes long time of 1000 year or more.

60 The pyramid which cannot be inverted in a stable ecosystem is that of **[CBSE AIPMT 1994]**

(a) biomass (b) number
(c) energy (d) All of these

Ans. *(c)*

Pyramid of energy is graphic representation of amount of energy trapped per unit time and area in different trophic levels of a food chain with producers forming the base and top carnivores or consumers the tip. It is always **upright** in shape.

61 Pyramid of number deals with number of **[CBSE AIPMT 1993]**

(a) species in an area
(b) individuals in a community
(c) individuals in a trophic level
(d) sub-species in a community

Ans. *(c)*

Pyramid of number is a graphic representation of the number of organisms per unit area of various trophic levels. It deals with the number of individuals in a trophic level. It deals with the number of individuals in a trophic level. It deals with the number of individuals in a trophic level.

62 Pyramid of number in a pond ecosystem is **[CBSE AIPMT 1993, 1991, 1990]**

(a) irregular (b) inverted
(c) upright (d) spindle-shaped

Ans. *(c)*

Pyramid of number in a pond ecosystem is upright or erect, in which producers are maximum in number and top consumers are least in number.

TOPIC 4
Nutrient Cycling

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

(a) climax
(b) Climax community
(c) standing state
(d) standing crop

Ans. *(c)*

Standing state is the amount of biogenetic nutrients present at any specific time in the ecosystem. The whole living matter is composed of nutrients Like carbon, nitrogen and so on.

Other options can be explained as:

Climax, in ecology, is the final stage of biotic succession attainable by a plant community in an area under the environmental conditions present at a particular time.

A climax community is one that has reached the stable stage. When extensive and well-defined, the climax community is called a biome. Examples are tundra, grassland, desert, and the deciduous, coniferous and tropical rain forests.

Each trophic level contains certain mass of living matter at a specific time is called standing crop.

64 Which of the following statements is incorrect regarding the phosphorus cycle? **[NEET (Oct.) 2020]**

(a) Phosphates are the major form of phosphorus reservoir
(b) Phosphorus solubilising bacteria facilitate the release of phosphorus from organic remains
(c) There is appreciable respiratory release of phosphorus into atmosphere
(d) It is sedimentary cycle

Ans. *(c)*

Staement (c) is incorrect and can be corrected as Phosphorus cycle is a type of sedimentary cycle, i.e. it main reservoirs are soil and rocks. It is mainly found as phosphates in rocks. During this cycle phosphorus solublising bacteria like *Pseudomonas*, *Acetobacter*, etc., help to release phosphorus from organic remains. A large amount of phosphate is lost in sea by sedimentation. There is no respiratory release of phosphorus into atmosphere because phosphorus is an inorganic nutrient that does not take part in respiration.

65 In which of the following both pairs have correct combination? **[CBSE AIPMT 2015]**

(a)	Gaseous nutrient cycle	Carbon and nitrogen
	Sedimentary nutrient cycle	Sulphur and phosphorus
(b)	Gaseous nutrient cycle	Carbon and sulphur
	Sedimentary nutrient cycle	Nitrogen and phosphorus
(c)	Gaseous nutrient cycle	Nitrogen and sulphur
	Sedimentary nutrient cycle	Carbon and phosphorus
(d)	Gaseous nutrient cycle	Sulphur and phosphorus
	Sedimentary nutrient cycle	Carbon and nitrogen

Ans. *(a)*

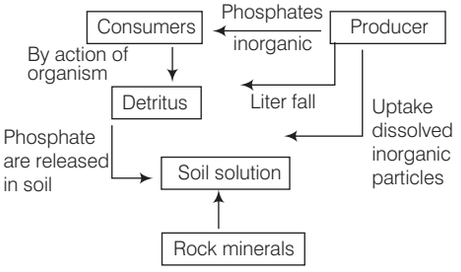
The biogeochemical cycles are of two types, i.e. gaseous cycles, in which the reservoir for the nutrient elements is in the atmosphere (air) or hydrosphere (water). The four most abundant elements in the living systems, i.e. hydrogen, carbon, oxygen and nitrogen have predominantly gaseous cycles.

In sedimentary cycles, the reservoir for the nutrient elements is in the sediments of the earth. Elements, such as phosphorus, sulphur, potassium and calcium have sedimentary cycles.

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

	A	B	C	D
(a)	Rock minerals	Detritus	Litter fall	Producers
(b)	Litter fall	Producers	Rock minerals	Detritus
(c)	Detritus	Rock minerals	Producer	Litter fall
(d)	Producers	Litter fall	Rock minerals	Detritus

Ans. *(c)*



Phosphorus cycle

67 Natural reservoir of phosphorus is **[NEET 2013]**

(a) rock
(b) fossils
(c) sea water
(d) animal bones

Ans. *(a)*

The natural reservoir of phosphorus is in phosphate rocks. Phosphate is added in small amount into the cycling pool through weathering of rocks. Phosphate circulate in the abiotic environment in lithosphere as well as hydrosphere.

68 Which one of the following is not a gaseous biogeochemical cycle in ecosystem? **[CBSE AIPMT 2012]**

(a) Sulphur cycle
(b) Phosphorus cycle
(c) Nitrogen cycle
(d) Carbon cycle

Ans. *(b)*

Phosphorus cycle is a sedimentary biogeochemical cycle. It describes the movement of phosphorus through the lithosphere, hydrosphere and biosphere and the main reservoir pool is lithosphere.

Atmosphere does not play any significant role in the movement of phosphorus because phosphorus and phosphorus based compounds are usually solids at the typical ranges of temperature and pressure found on earth. The production of phosphine gas occurs only in specialised, local conditions.

69 About 70% of total global carbon is found in **[CBSE AIPMT 2008]**

(a) grasslands
(b) agroecosystems
(c) oceans
(d) forests

Ans. *(c)*

Sea water contains 50 times more CO_2 than air. i.e. about 70% of total global carbon is found in oceans. This is in form of carbonates and bicarbonates. The atmosphere is the source of CO_2, which is utilised by plants in photosynthesis reduced to form carbon compounds. The total mass of carbon currently in the atmosphere is about 7×10^{17} g, i.e. 700000 million tonnes. Oceans regulate the CO_2 content in the atmosphere and thus, play a very important role.

70 Which one of the following pair is mismatched? **[CBSE AIPMT 2005]**

(a) Biomass burning– Release of CO_2
(b) Fossil fuel burning – Release of CO_2
(c) Nuclear power – Radioactive wastes
(d) Solar energy – Green house effect

Ans. *(d)*

Solar energy is not responsible for green-house effect instead it is a source of energy for the plants and animals. Green plants prepare their food by the use of this solar energy. CO_2 gas is mainly responsible for greenhouse effect. Excess of this gas forms a thick layer around the earth and prevents re-radiation of earth climate entering sun rays to atmosphere. Thus, functions like the glass pannels of a green house (or the glass windows of a motor car). This is thus, called greenhouse effect.

71 If by radiation all nitrogenase enzymes are inactivated, then there will be no **[CBSE AIPMT 2004]**

(a) fixation of nitrogen in legumes
(b) fixation of atmospheric nitrogen
(c) conversion from nitrate to nitrite in legumes
(d) conversion from ammonium to nitrate in soil

Ans. *(c)*

The rate of total capture of energy or the rate of total production of organic material is gross primary productivity while the balance or biomass remaining after meeting the cost of respiration of producers is net primary productivity. Hence, gross productivity has highest value in grassland ecosystem.

72 Which of the following pair is a sedimentary type of biogeochemical cycle? **[CBSE AIPMT 1995]**

(a) Oxygen and nitrogen
(b) Phosphorous and sulphur
(c) Phosphorous and nitrogen
(d) Phosphorus and carbon dioxide

Ans. *(b)*

In sedimentary cycle the reservoir for the elements is in the sediments of earth (lithosphere), e.g. phosphorus, calcium, magnesium, sulphur.

73 The main role of bacteria in the carbon cycle involves **[CBSE AIPMT 1998]**

(a) photosynthesis
(b) chemosynthesis
(c) digestion or breakdown of organic compounds
(d) assimilation of nitrogenous compounds

Ans. *(c)*

Huge amount of plants, animals and human wastes are decomposed by bacteria and fungi present in environment and large quantity of CO_2 necessary for photosynthesis is released into the atmosphere.

74 Bulk CO_2-fixation occurs in **[CBSE AIPMT 1994]**

(a) crop plants
(b) oceans
(c) tropical rain forests
(d) temperature forests

Ans. *(b)*

Bulk CO_2-fixation occurs in oceans. The productivity of ocean ecosystem is very high, here phytoplanktons, e.g. diatoms are the greatest producers.