

- Biogeography reveals that living organisms are found practically everywhere on this earth.
- A.G.Tansley (1935) defined ecosystem as the system resulting from the interaction of all the living and non-living factors of the environment.
- The biotic and abiotic components are linked with each other through unidirectional energy flow and nutrient cycling.
- Living organisms are produced through chemical evolution.
- Ecosystem is a structural unit of ecology.
- Each ecosystem is maintained and remained healthy due to energy flow.
- The sun is the main source of energy in ecosystem.

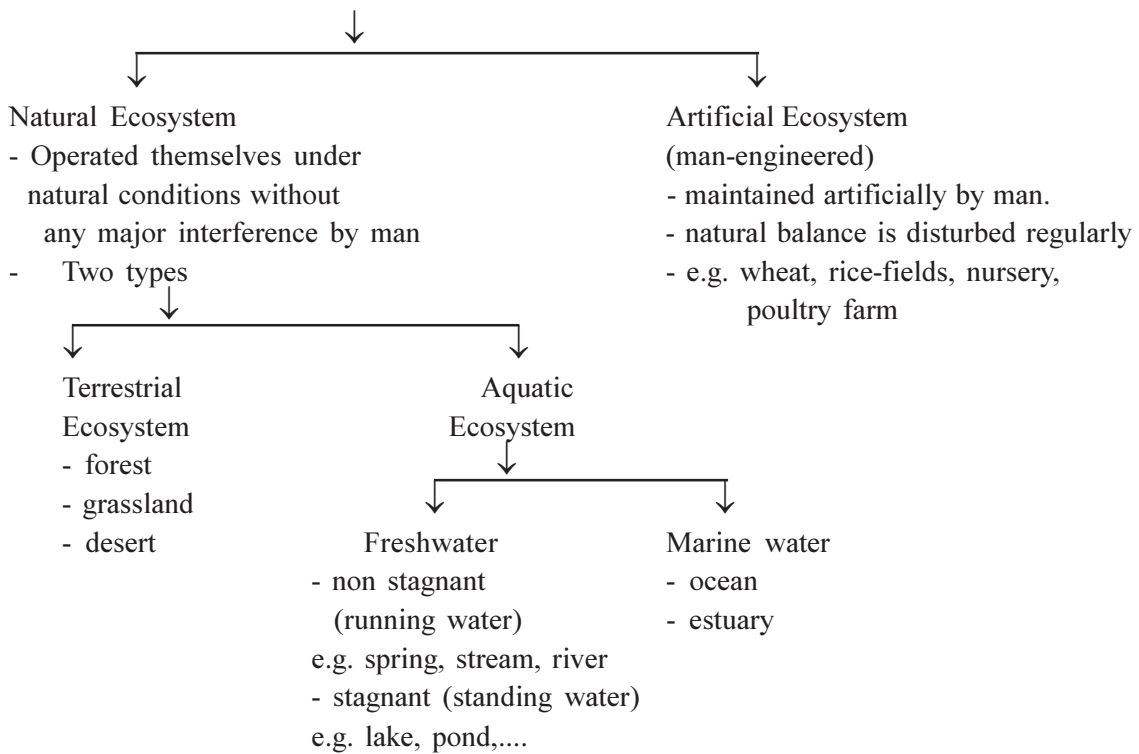
- (1) The term 'Ecosystem' given by .....
- (A) Odum (B) A.G. Tansley  
(C) Hatch - Slack (D) Robert Hook
- (2) The biotic and abiotic components are linked with each other through ..... energy flow and ..... material flow.
- (A) bidirectional, cyclic (B) cyclic, bidirectional  
(C) unidirectional, cyclic (D) cyclic, unidirectional
- (3) Living organisms are produced through .....
- (A) Biological evolution (B) Physical evolution  
(C) Bio-chemical evolution (D) Chemical evolution
- (4) What does a biotic community called when it is regulated by abiotic components ?
- (A) Biomes (B) Biosphere  
(C) Ecosystem (D) Bio geography
- (5) What makes an ecosystem healthy and maintained ?
- (A) Bio-geochemical cycle (B) Energy-flow  
(C) cycling of nutrients (D) All given

**Answers : (1-B), (2-C), (3-D), (4-C), (5-B)**

### Kinds of Ecosystem :

Different types of ecosystem of nature, constitute the giant ecosystem, the biosphere.

→ **Two types of Ecosystem :**

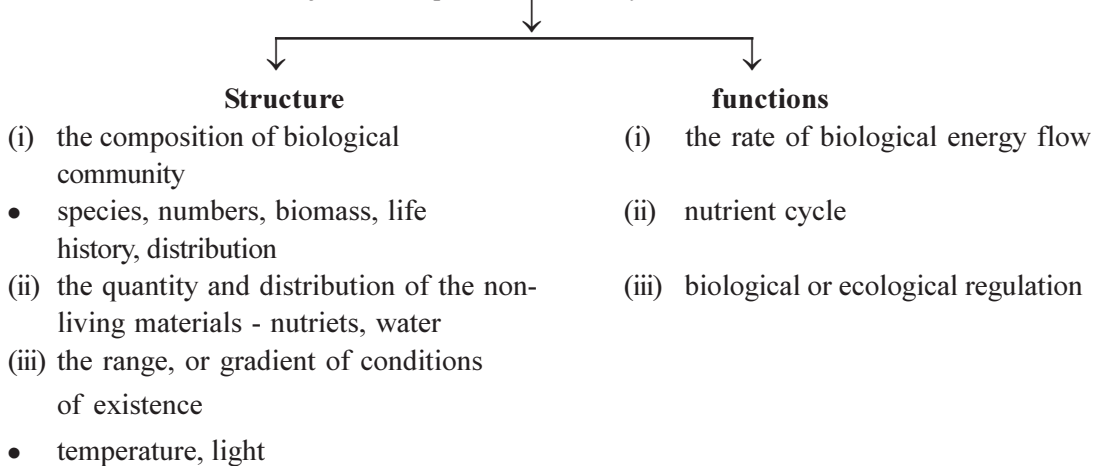


- (6) What does an ecosystem call which is operated by itself ?  
(A) Artificial ecosystem (B) Physical ecosystem  
(C) Natural ecosystem (D) A and C both
- (7) Wheat, rice fields includes in what kind of ecosystem ?  
(A) Artificial ecosystem (B) Natural ecosystem  
(C) Man-engineered ecosystem (D) A and C both

**Answers : (6-C), (7-D)**

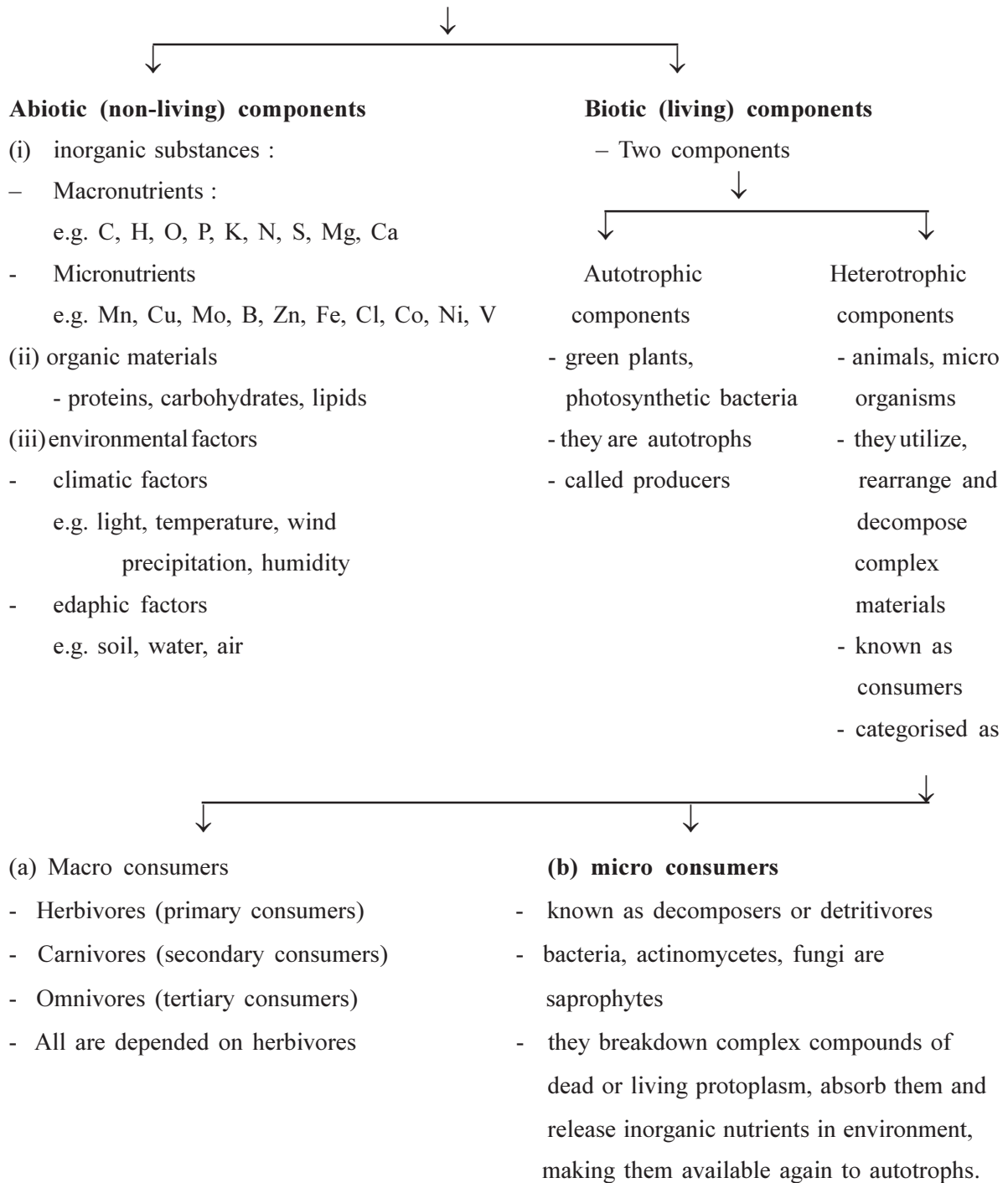
### Structure and function of ecosystem

There are major two aspects of an ecosystem



Thus, in any ecosystem, structure and functions are studied together.

## Structure of Ecosystem



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- (8) How many aspects are there in ecosystem ?  
 (A) 1                      (B) 2                      (C) 3                      (D) 4
- (9) In ecosystem which aspects are studied together ?  
 (A) Structure and energyflow                      (B) Functions and types  
 (C) Kinds and structure                      (D) Structure and function
- (10) Which option belongs to a macronutrients ?  
 (A) C,H,N,Cu                      (B) Bo, Zn, P, S                      (C) Mg, Si, K, S,                      (D) Mn, C, H, N

- (11) Which group belongs to micronutrients ?  
 (A) Mo, Mn, Mg, C (B) V, Ni, Co, Cu (C) Ca, Si, Mg, Mn (D) Zn, Fe, P, S
- (12) How many components has a trophic structure of any ecosystem ?  
 (A) 2 (B) 4 (C) 6 (D) 3
- (13) The members of these components utilise, rearrange and decompose the complex material.  
 (A) Consumers (B) Producers (C) Decomposers (D) All given
- (14) Consumers are further categorised into ..... groups.  
 (A) 2 (B) 3 (C) 4 (D) 6
- (15) They all are depended on herbivores.  
 (A) macroconsumers (B) microconsumers (C) consumers (D) all given
- (16) They decompose complex compounds, release inorganic nutrients, making them available to autotrophs.  
 (A) macroconsumers (B) microconsumers (C) consumers (D) all given

**Answers : (8-B), (9-D), (10-C), (11-B), (12-A), (13-A), (14-A), (15-A), (16-B)**

**Function of ecosystem :**

- Two important functions :  
 (1) flow of energy (ii) Biogeochemical cycling of materials

**Energy flow :**

- It begins when the producer organisms absorb sunlight and convert it into chemical energy by photosynthesis.
- Consumers utilize this chemical energy as food and finally released into atmosphere as heat energy.
- In this way flow of energy is unidirectional.

**Biogeochemical cycling of nutrients :**

- It begins when inorganic nutrients are absorbed by producers.
- The chemical elements present in these nutrients flow through various organisms are released into the physical environment.
- They are again absorbed by the producers.
- Thus, their transport occur from physical world into living world and from there back into physical world. This process is called Biogeochemical cycle.

- (17) The flow of energy begins when ..... organisms absorb sunlight.  
 (A) producer (B) consumer  
 (C) decomposers (D) A and C both
- (18) Which aspect begins when inorganic nutrients are absorbed by producer ?  
 (A) Energy flow (B) Nutrient - cycle  
 (C) Biogeochemical cycle (D) B and C both

**Answers : (17-A), (18-D)**

**\* Structure and Function of Ecosystem \***

- It may be analyzed in terms of :  
(i) food chains, food webs and ecological pyramids (ii) Energy flow (iii) Productivity  
(iv) Nutrient cycle

**Food Chain**

- The transfer of food energy from producers, through a series of organisms is known as food chain. (herbivores - carnivores - decomposers)
- food chain starts from primary producers.
- ends with carnivores.

**Types of food chain : Two types**

↓	↓
↓	↓
<b>Grazing food chain</b>	<b>Detritus food chain</b>
– begins with chlorophyllus producers	– begins with : decomposers
– extends through herbivores, carnivores, decomposers.	– Primary source of energy is dead organic matter called ‘detritus’.
	– eg. fallen leaves, plant parts or dead animal bodies.

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- (19) Food chain begins with..... and ends in ..... .  
(A) carnivores, producers (B) producers, carnivores  
(C) decomposers, carnivores (D) producers, decomposers
- (20) Grazing food chain begins with ..... .  
(A) decomposers (B) carnivores (C) producers (D) consumers
- (21) ‘Detritus’ means ..... .  
(A) Primary source of energy is dead organic matter.  
(B) Secondary source of energy is dead organic matter.  
(C) Primary source of energy is living organic matter.  
(D) Primary source of energy is living inorganic matter.
- (22) A detritus food chain begins with ..... .  
(A) producers (B) consumers (C) carnivores (D) decomposers

**Answers : (19-D), (20-C), (21-A), (22-D)**

**Food web :**

- Living organisms, depend on each other for their food requirement and form a chain called food chain.
- The animals are inter - dependent for food and they form a net which is termed as a food web.

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- (23) How do flow of energy and nutrient - cycling represented in an ecosystem ?  
(A) by structure and function  
(B) by nutrient pyramid  
(C) by composition of ecosystem  
(D) food chain

- (24) Which term is used for indicating inter-dependent food in net form ?  
 (A) food chain (B) food web (C) nutrient web (D) all given

**Answers : (23-D), (24-B)**

**Trophic levels**

- It is one kind of producer consumer arrangement. Where each food level is known as ‘trophic level.’
- “Successive levels of nourishment in the food chains and food web of a community.”

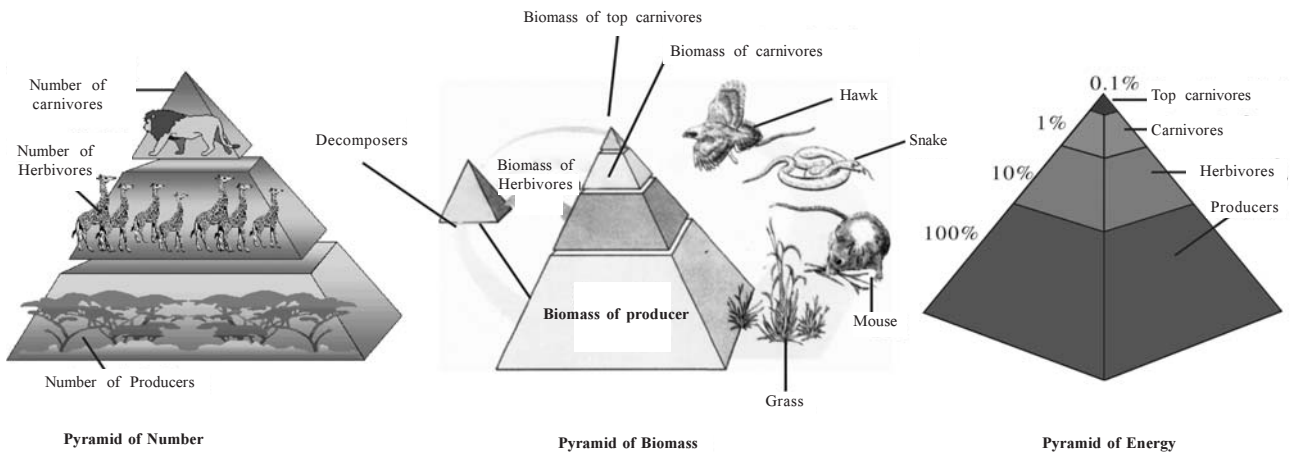
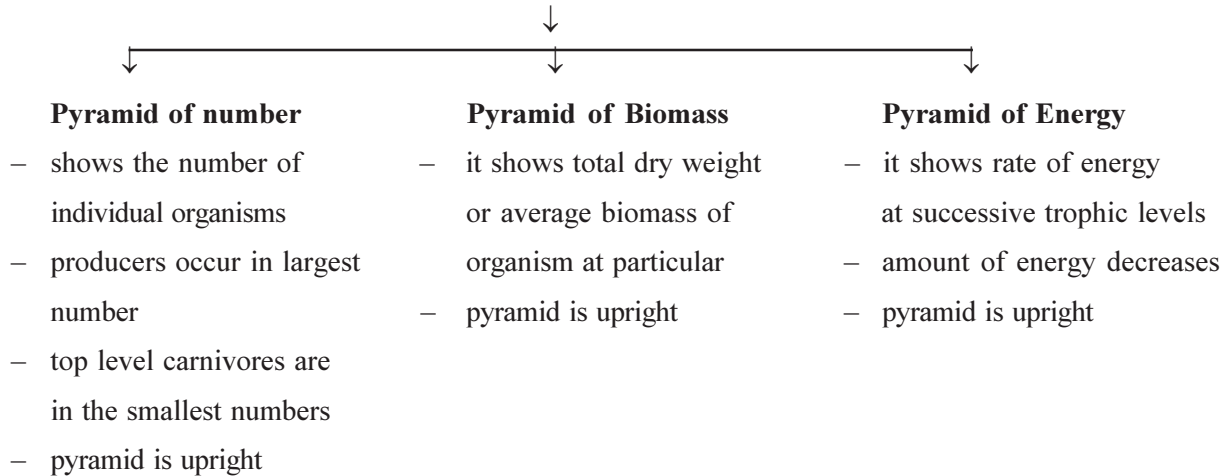
- (25) In the arrangement of producers and consumers, each food level is known as ..... .  
 (A) food chain (B) food web (C) trophic level (D) food level

**Answers : (25-C)**

**Ecological Pyramid**

- The trophic structure and function at successive trophic levels may be graphically represented by means of ecological pyramid.
- Base of pyramid - first trophic level (producers)
- apex of pyramid - successive levels of trophic level

**Three types of ecological pyramid**





**(1) Primary productivity :** In a given region the total production over a given period of time is called primary productivity of that ecosystem.”

- measured : annual grams of dry weight (measured as tons) per hectare  $g/m^2/yr$ .
- It is further two types :

**(A) Gross Primary Productivity (GPP) :**

- “The total rate of photosynthesis carried out by all producer organisms in an ecosystem.”
- It depends on chlorophyll content.
- measured : Chl/g dry weight/unit area, or photosynthetic number
- $GPP = NPP + \text{Respiratory loss}$

**(B) Net Primary Productivity (NPP) :**

- The rate of storage of organic matter in plant tissues in excess of the respiratory utilization by plants.
- It is referred to as the net primary production (NPP).
- It is located in the plant biomass.
- $NPP = GPP - \text{Respiratory loss}$

**(2) Secondary Productivity :** “The amount of energy storage at consumer (herbivores) level.”

- Consumers obtain energy by consuming producers as food.

**(3) Net Productivity :** “The amount of storage of organic matter not used by the heterotrophs (consumers)” .

- measured as : days, months, season or year basis.
- Different ecosystems have different productivity.
- high in forest, medium in grasslands and low in deserts.
- In aquatic habitat decreases with increasing depth.

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(32) What does formation of organic matter or biomass in an ecosystem call ?

- (A) productivity                      (B) synthesis                      (C) production                      (D) all given

(33) It is measured as grams of dry weight (measured as tons) per hectare  $g/m^2/yr$ .

- (A) GPP                      (B) NPP                      (C) primary productivity (D) all given

(34) The total rate of photosynthesis carried out by all producer organisms in an eco-system is called .....

- (A) GPP                      (B) NPP                      (C) primary productivity (D) all given

(35) Its value depends on the chlorophyll content.

- (A) Primary productivity                      (B) GPP  
(C) NPP                      (D) secondary productivity

(36)  $GPP = \dots\dots\dots + \text{Respiratory loss}$

- (A) NPP                      (B) primary productivity  
(C) Secondary productivity                      (D) NPP

(37) The amount of storage of organic matter not used by heterotrophs (consumers) is known as .....

- (A) NPP                      (B) Primary productivity  
(C) Secondary productivity                      (D) GPP

(38) In aquatic habitat productivity .....

- (A) increases                      (B) high                      (C) low                      (D) decreases

(39) What is right option for productivity in desert, grasslands and forest.

- (A) high, medium, low                      (B) medium, high, low  
(C) low, medium, high                      (D) high, low, medium

**Answers : (32-C), (33-C), (34-A), (35-B), (36-A), (37-C), (38-D), (39-C)**

## Decomposition

“The process by which dead or complex organic material is broken down into simpler forms of matter which resembles with the soil.”

- Decomposers : Bacteria, fungi and some worms break down the body of dead plants, animals and insects. They are called decomposers.
- They need to eat some of the dead things. So they can live and grow.
- Common decomposers are : bacteria, fungi, earthworms.
- The parts of inorganic matters that living plants take to grow are called nutrients.
- Decomposers help to provide these nutrients to plants.

### Process of Decomposition : three stages.

#### (1) Fragmentation :

- First the detritus is fed upon by detritus-feeding animals.
- Changes occur in size and form of detritus when passes through the alimentary canal of these animals.
- The food is chewed, ground and filtered.
- Large surface area is made available for future degradation.
- These materials are added to the soil as faecal material of such animals.

#### (2) Leaching :

- It is a process in which water leaches deep down into the soil, so dissolved materials in the soil move towards the deeper layers of soil.

#### (3) Catabolism :

- Extracellular enzymes secreted by various kinds of fungi and bacteria begin the process of catabolic activities.
- First, complex organic matter is converted into simple organic forms and salts.
- Then they undergo to the processes of humification and mineralization.
- When humus is mineralized, these salts and ions are released in the forms which are available to plants.

(40) The process by which dead or complex organic material is broken down into simpler forms of matter which mixes with soil is called ..... .

- (A) analysis                      (B) decomposition                      (C) leaching                      (D) fragmentation

(41) What do decomposers need to eat to live and grow ?

- (A) Organic matter                      (B) Inorganic matter                      (C) Dead matter                      (D) All given

(42) They are common decomposers of an ecosystem.

- (A) bacteria, virus, fungi                      (B) virus, fungi, earthworms  
(C) fungi, worms, virus                      (D) bacteria, fungi, earthworms

(43) In this stage of decomposition size and form of detritus changes.

- (A) fragmentation                      (B) leaching                      (C) absorption                      (D) humification

(44) Humification and mineralization occur in this stage.

- (A) fragmentation                      (B) leaching                      (C) catabolism                      (D) absorption

(45) When humus is ....., salts and ions are released in the forms which are available to plants

- (A) Leaching                      (B) Ionisation                      (C) Mineralization                      (D) All the given

**Answers : (40-B), (41-C), (42-D), (43-A), (44-C), (45-C)**

**\* Biogeochemical Cycles \***

“The cyclic pathways through which chemical elements travel from the environment into the organisms and from the organisms into the environment regularly and continuously are called biogeochemical cycles.

Bio - organisms ; geo - soil, rocks, water;

Chemical - C, N, S etc. chemical elements.

- Two types of cycles :

(1) Gaseous Cycle : Carbon cycle, Nitrogen Cycle, Oxygen Cycle

**Carbon Cycle :**

- Carbon occurs as  $\text{CO}_2$  in atmosphere, as graphite and diamond in nature.
- Carbon is one of the most essential element of organic compounds.
- Green plants obtain carbon as  $\text{CO}_2$  from air and by photosynthesis convert it into carbohydrate.
- When animals feed upon plants, thus carbohydrates enter into the bodies of these animals.
- In animals, in mitochondria during final respiratory pathway, carbohydrates are broken down yielding energy, where  $\text{CO}_2$  and  $\text{H}_2\text{O}$  are the waste products.
- $\text{CO}_2$  releases in the air or water.
- Plants also liberate  $\text{CO}_2$  in air during respiration.
- The burning of coal and fossil fuels (petroleum products) also adds  $\text{CO}_2$  in air.

**Sedimentary Cycle :** Phosphorus cycle, Sulphur cycle.

- Phosphorous Cycle : It is an example of sedimentary cycle.
- It is found in nucleic acids, cell membrane, phospholipids, NADP (Nicotinamide adenine dinucleotide phosphate), bones, teeth and ATP (Adenosine triphosphate) as a universal fuel of living organisms.
- The greatest reservoir of phosphates in the world lies in form of insoluble ferric and phosphates in rocks.
- Erosion caused by rainfall and the runoff of streams remove phosphorous from these rocks.
- This results in phosphorous supply in the soil which is available to plants.
- Animals obtain phosphorous from plants.
- After the death of living organisms, phosphorous returns to the water and soil in ion form and recycle in ecosystem.
- In higher plants, the symbiotic fungus (mycorrhiza) living on root systems helps in absorption of phosphate.
- A modern source of phosphorous is the common household detergents which now enter waste water system and then released into streams, lakes and estuaries.
- The phosphorous in soil is dissolved in water, in run flows into bodies of water.
- Some of this is used by plankton, which is eaten by fish, which are consumed by sea birds.
- But the majority of phosphorous washed into sea sinks to the ocean floor and is not recycled.
- The loss of phosphorous to the ocean has been greater than the gain to land.

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- (46) The cyclic pathway through which chemical elements travels from environment into organism and then in reverse mode regularly and continuously is called ..... .
- (A) Bio-chemical cycle (B) Bio-geo cycle  
(C) Geo-chemical cycle (D) Bio-geo chemical cycle
- (47) They are the examples of gaseus cycle and sedimentary cycle respectively.
- (A) N-Cycle, S-Cycle (B) P-Cycle, C-Cycle  
(C)  $\text{O}_2$ -Cycle, C-Cycle (D) S-Cycle, P-Cycle
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- (48) In which form carbon is found in nature ?  
 (A) CO<sub>2</sub>, Graphite (B) Graphite, Diamond (C) CO<sub>2</sub>, Diamond (D) CO<sub>2</sub>
- (49) Which is the greatest reservoir of phosphate in the world ?  
 (A) Soluble ferric and calcium phosphates in rocks.  
 (B) Insoluble ferric and calcium phosphates in rocks.  
 (C) Soluble ferric and calcium phosphates in water bodies.  
 (D) Insoluble ferric and calcium phosphates in water bodies.
- (50) Which organisms release bacteria from the dead bodies as phosphate from organic phosphorous compound and makes available to plants ?  
 (A) Virus (B) Bacteria (C) Fungi (D) All given
- (51) Which is the modern source of phosphorous ?  
 (A) Bathing detergent (B) Utensil detergent (C) Washing detergent (D) All given
- (52) Which sequence shows right cycling of phosphorous in water bodies ?  
 (A) planktons - fishes - sea birds (B) fishes - planktons - large sea creatures  
 (C) planktons - fishes - large sized fishes (D) planktons - sea birds - fishes
- (53) Which organisms living on root system of higher plants helps in absorption of phosphate ?  
 (A) Symbiotic fungi (B) Mycorrhiza (C) A , B both (D) None of these
- (54) Which phosphorous is not recycled ?  
 (A) Lies in detergent (B) Sinks to the ocean floor  
 (C) Lies in dead bodies (D) All given
- (55) The loss of phosphorous to the ocean has been ..... than the gain to land.  
 (A) greater (B) less (C) negligible (D) little

**Answers : (46-D), (47-A), (48-B), (49-B), (50-B), (51-C), (52-A), (53-C), (54-B), (55-A)**

**\*Carbon Fixation \***

Carbon fixation is important for both animals and plant life.

- It is conversion CO<sub>2</sub> into organic compounds during photosynthesis, whereby it changed into sugars.
  - The calvin cycle is the most common biological method of carbon fixation.
  - There are three ways of carbon fixation during photosynthesis.
- (1) **C<sub>3</sub> plants:** During calvin cycle CO<sub>2</sub> incorporates to form a 3-carbon compound as the first stable compound.  
 eg. majority of terrestrial species.
- (2) **C<sub>4</sub> plants :** Through calvin cycle CO<sub>2</sub> incorporate into 4-carbon compound.  
 - They have a distinctive internal leaf anatomy.  
 - e.g. sugar cane, maize plants
- (3) **CAM (Crassulacean Acid Metabolism) :**
- These plants show adaptations for arid conditions.
  - At night CO<sub>2</sub> enters through stomata and converted into organic acids, which releases CO<sub>2</sub> for use in calvin cycle during the day, when stomata are closed.

- (56) How many ways of carbon fixation in plants during photosynthesis ?  
 (A) 1 (B) 3 (C) 4 (D) 6
- (57) To get adaptations against arid conditions, some plants follow which path for CO<sub>2</sub> - fixation ?  
 (A) C<sub>2</sub> - path (B) C<sub>3</sub> - path (C) C<sub>4</sub> - path (D) CAM - path

**Answers : (56-B), (57-D)**

**\* Pollution free Oxygen \***

- O<sub>2</sub> is good for healthy body and it is our primary life-support.
- clean air contains 19% - 21% O<sub>2</sub>.
- In ancient times people lived longer because the air was composed of 40% O<sub>2</sub>.
- The generation and maintenance of all our body processes are supported by four basic life-support components: carbohydrates, water, proteins, energy.
- Most scientists agree that O<sub>2</sub> is actually the over-riding key ingredient in all four of these life-support components.
- 80% of all our metabolic energy production is created by O<sub>2</sub>.

**Facts about Oxygen :**

- (1) Lack of oxygen in our universe is due to pollution, burning of fossil fuels and by CFC (Chloro Fluro Carbon) over all destruction of ozone layer.
- (2) Everyday we breathe 20,000 times.
- (3) Blood is the liquid carrier of O<sub>2</sub> that fuels all systems, stimulates chemical reactions and cleans itself of wastes and toxins.
- (4) By mass, oxygen makes up 90% of the water molecule; water makes up 65-75% of human body.
- (5) Cancer attacks every organ in our body, except the heart because of its abnormal supply of oxygen.

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- (58) Clean air contains ..... oxygen ?  
(A) 18-21%                      (B) 19-22%                      (C) 18-22%                      (D) 19-21%
- (59) In ancient time air was composed of ..... oxygen.  
(A) 20%                      (B) 40%                      (C) 36%                      (D) 41%
- (60) How much % of all our metabolic energy production is created by oxygen.  
(A) 65-70%                      (B) 19-21%                      (C) 40%                      (D) 80%
- (61) They cause destruction in ozone layer.  
(A) fossil fuel, CO<sub>2</sub>                      (B) fossil fuel, CFC  
(C) fuels, CO<sub>2</sub>                      (D) fuels, CFC
- (62) How many times we breath everyday ?  
(A) 10,000                      (B) 20,000                      (C) 30,000                      (D) 40,000
- (63) What mass oxygen makes in water molecule and water in human body ?  
(A) 80%, 65-70%                      (B) 90%, 55-70%                      (C) 90%, 65-70                      (D) 65-70%, 90%
- (64) Cancer attacks every organ in our body except this organ ..... .  
(A) brain                      (B) kidney                      (C) liver                      (D) heart

**Answers : (58-D), (59-B), (60-D), (61-B), (62-B), (63-C), (64-D)**

**A - Assertion R - Reason type MCQS**

**Choose the correct option of the following :**

- (A) A and R both are correct and R is the correct explanation of A.
- (B) A and R both are correct but R is not correct explanation of A.
- (C) A - True, R - False
- (D) A - False, R - True

- (65) Statement A : Ecosystem is a structural unit of ecology.

Reason R : Each ecosystem is composed of biotic community and environmental factors :

- (A)                      (B)                      (C)                      (D)

- (66) Statement A : Ecosystems of ponds and lakes are natural ecosystems.  
Reason R : They are operated by themselves under natural conditions without interference by man.  
(A) (B) (C) (D)
- (67) Statement A : In any ecosystem, structure and functions are studied independently.  
Reason R : The characteristic structure of an ecosystem is obtained by the systematic physical organisation of the biotic and abiotic components of that particular ecosystem.  
(A) (B) (C) (D)
- (68) Statement A : Heterotrophic components are constituted mainly by animals and microorganisms.  
Reason R : They utilise, rearrange and decompose the complex materials.  
(A) (B) (C) (D)
- (69) Statement A : Decomposers are known as detritivores.  
Reason R : They breakdown complex compound of dead or living protoplasm, absorb some of the decomposed or breakdown and release organic nutrients in environment.  
(A) (B) (C) (D)
- (70) Statement A : The energy flow begins when the producer organisms absorb sunlight.  
Reason R : The material cycle begins when inorganic nutrients are absorbed by producer organisms.  
(A) (B) (C) (D)
- (71) Statement A : Detritus food chain begins with decomposers.  
Reason R : Primary source of energy is dead organic matter called 'detritus'.  
(A) (B) (C) (D)
- (72) Statement A : Living organisms depend on each other for their food requirement and form a chain which is termed as food chain.  
Reason R : The animals are inter-dependent for food and they form a net is called food chain.  
(A) (B) (C) (D)
- (73) Statement A : Successive levels of nourishment in the food chains and food webs of a community is called trophic level.  
Reason R : Each trophic level contains organisms whose food is obtained from plants by the same number of steps.  
(A) (B) (C) (D)
- (74) Statement A : In every ecosystem pyramids of energy are always upright.  
Reason R : Depending upon the nature of trophic levels pyramids of numbers and biomass may be upright or inverted.  
(A) (B) (C) (D)
- (75) Statement A : Secondary productivity is measured in dry weight per hectare  $\text{g/m}^2/\text{yr}$ .  
Reason R : The amount of energy storage at consumer (herbivores) level is called secondary productivity.  
(A) (B) (C) (D)
- (76) Statement A : Bacteria, fungi and some worms breakdown the body of dead plants, animals and insects.  
Reason R : Decomposers need to eat some of the dead things so they can live and grow.  
(A) (B) (C) (D)

- (77) Statement A : The organic matters that living plants take to grow are called nutrients.  
Reason R : Green plants make their own food, but they also need to get nutrients from the soil.  
(A) (B) (C) (D)
- (78) Statement A : When humus is mineralised, salts and ions are available to plants.  
Reason R : Extracellular enzymes secreted by various kinds of fungi and bacteria begin the process of anabolic activities.  
(A) (B) (C) (D)
- (79) Statement A : The greatest reservoir of phosphates in the world lies in soluble ferric and calcium forms in rocks.  
Reason R : After the death of living organisms, phosphorous adds to soil from their bodies in ion form.  
(A) (B) (C) (D)
- (80) Statement A : Cancer attacks every organ in our body except the heart.  
Reason R : Heart gets abnormal supply of oxygen.  
(A) (B) (C) (D)

**Answers : (65-B), (66-A), (67-D), (68-A), (69-C), (70-B), (71-A), (72-C), (73-A), (74-C), (75-D), (76-A), (77-D), (78-C), (79-D), (80-A)**

• **True - False type questions**

- (81) (1) The term ecosystem was first proposed by A.G. Tansley (1965).  
(2) Individuals of each species can produce population in the same time and space.  
(3) Ecosystem is a structural unit of ecology.  
(4) The biotic and abiotic components are linked with each other through unidirectional energy flow and nutrient cycling.  
(A) FFFT (B) FTTT (C) TFFT (D) TTTT
- (82) Choose appropriate statements for structure of Ecosystem.  
(1) The range or gradient of conditions of existence.  
(2) Biological or Ecological regulation.  
(3) The quantity and distribution of non-living materials.  
(4) The composition of biological community.  
(A) TTFB (B) TTFT (C) TFFT (D) FTTT
- (83) Choose right option for Abiotic components of an ecosystem.  
(1) As macronutrients C, H, S are present.  
(2) Micronutrients are Ca, Mg, Mo, Cu.  
(3) Proteins, carbohydrates and lipids are organic materials.  
(4) Environmental factors and physical factors act as Climatic factors.  
(A) TTFB (B) FTTT (C) TTFT (D) TFFT

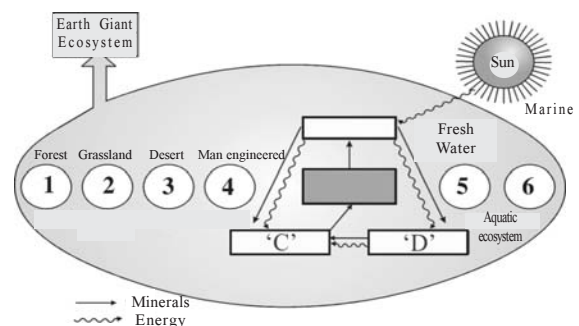
- (84) (1) Clean air contains 19% - 21% oxygen.  
 (2) Four basic life components support the generation and maintenance of all our body processes.  
 (3) All metabolic processes in our body are regulated by oxygen.  
 (4) Oxygen produces 70% of all our metabolic energy.  
 (A) FTTF (B) FFFT (C) FTTF (D) FTFT
- (85) (1) Specific bacteria release phosphorous from dead bodies as phosphate from organic phosphorous compounds.  
 (2) After the death of organisms, phosphorous release in salts form in the soil.  
 (3) Majority of phosphorus washed into the water bodies to the floor.  
 (4) For biological systems phosphorous is an essential sedimentary cycle.  
 (A) TTFT (B) TFFT (C) FTTF (D) TTTT
- (86) Choose appropriate option for catabolism process of decomposition.  
 (1) Extracellular enzymes secreted by various kinds of fungi and worms begin the process of catabolic activities.  
 (2) First of all complex organic matter is converted into simple organic, then to inorganic ions and salts.  
 (3) Then they undergo mineralization and humification respectively.  
 (4) When humus is mineralized, salts and ions are released in the forms which are available to plants.  
 (A) TFTF (B) FTTF (C) TTFT (D) FTFT
- (87) (1) Energy remains after used by producers, is available to the consumers is called Net productivity.  
 (2) GPP depends on the Chlorophyll content.  
 (3) The amount of stored organic matter not used by heterotrophs is called net productivity.  
 (4) The productivity increases as increasing depth in aquatic habitat.  
 (A) TFFT (B) TFFT (C) FTTF (D) FTFF
- (88) Choose appropriate option from energetic point of view in an ecosystem.  
 (1) The efficiency of producers in absorption and conversion of solar energy.  
 (2) The use of converted chemical energy by producers.  
 (3) Total input of energy in form of food and its efficiency of cycling.  
 (4) Gross net productivity.  
 (A) TFFF (B) TFFF (C) TFFT (D) TFFT
- (89) Choose right option for ecological pyramids.  
 (1) Producers are in the largest number and top level of carnivores are in the smallest number.  
 (2) Biomass shows the total dry weight of organisms at a particular trophic level.  
 (3) It shows rate of energy or productivity at successive trophic levels.  
 (4) According to first law of thermodynamic, during energy conversion some energy is dissipated in the form of heat.  
 (A) TTTT (B) TTTF (C) TFFT (D) FTTF

**Answers : (81-B), (82-C), (83-A), (84-A), (85-B), (86-D), (87-C), (88-A), (89-B)**

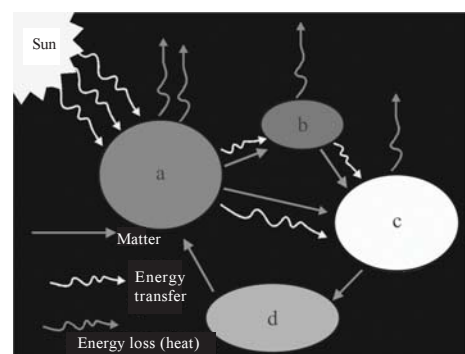
- (90) **Column - I** **Column - II**
- |   |   |          |           |            |           |
|---|---|----------|-----------|------------|-----------|
| (I) the composition of biological community                 | (p) water                               | <b>I</b> | <b>II</b> | <b>III</b> | <b>IV</b> |
| (II) range or gradient of conditions of existence           | (q) life-cycle (life-history)           | (A) s    | q         | p          | r         |
| (III) the quantity and distribution of non-living materials | (r) biological or ecological regulation | (B) s    | r         | p          | q         |
| (IV) function   | (s) temperature                         | (C) q    | s         | p          | r         |
|   |   | (D) r    | q         | p          | s         |
- (91) **Column - I** **Column - II**
- |                             |   |
|-----------------------------|---|
| (I) Net productivity        | (p) It depends on the chlorophyll content.                            |
| (II) secondary productivity | (q) Energy remains after use by producers, is available to consumers. |
| (III) GPP                   | (r) It is consolidated on days, month, season or year basis.          |
| (IV) NPP                    | (s) The amount of energy storage at consumer (herbivores) level       |
- |     |          |           |            |           |
|-----|----------|-----------|------------|-----------|
|     | <b>I</b> | <b>II</b> | <b>III</b> | <b>IV</b> |
| (A) | r        | p         | q          | s         |
| (B) | r        | s         | p          | q         |
| (C) | s        | r         | p          | q         |
| (D) | p        | r         | q          | s         |
- (92) **Column - I** **Column - II**
- |                   |  |       |   |   |
|-------------------|--|-------|---|---|
| (I) fragmentation | (p) materials are added to the soil as faecal material of animals                | (A) q | p | r |
| (II) leaching     | (q) complex organic matters is converted into inorganic ions and salts           | (B) r | p | q |
| (III) catabolism  | (r) dissolved materials leach in the soil move towards the deeper layers of soil | (C) p | r | q |
|                   |  | (D) q | r | p |

**Answers : (90-C), (91-B), (92-C)**

- (93) What does 'C' indicates in given diagram.
- (A) They are autotrophs.  
 (B) They belong to second trophic level  
 (C) They decompose living or dead matters.  
 (D) B and C both

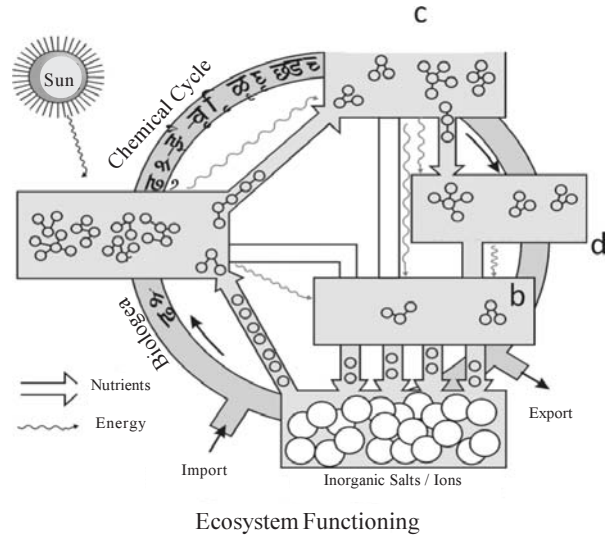


- (94) What does 'a' indicate in given diagram.
- (A) They are food source to another organisms.  
 (B) They fix the energy.  
 (C) They initiate flow of energy.  
 (D) All given



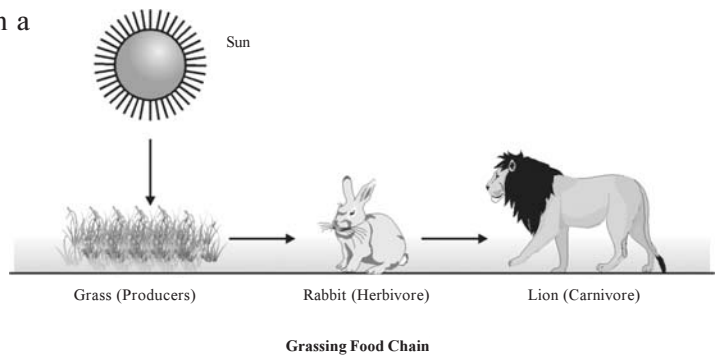
(95) Choose write option for a, b, c, d for diagram.

- (A) a = producers      b = herbivores  
c = carnivores      d = decomposers
- (B) a = producers      b = decomposers  
c = carnivores      d = herbivores
- (C) a = producers      b = decomposers  
c = herbivores      d = carnivores
- (D) a = producers      b = herbivores  
c = decomposers      d = carnivores



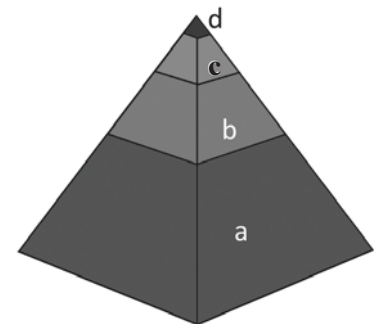
(96) Choose correct option for given diagram.

- (A) Living organisms depend on each other for their food requirement and form a chain called food chain.
- (B) Interactions of animals for food is called food web.
- (C) It is a grazing food chain.
- (D) A and C both.



(97) Choose ascending order of energy pyramid.

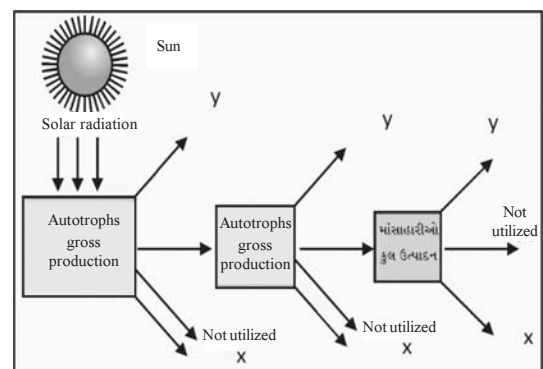
- (A) a → b → c → d
- (B) d → c → b → a
- (C) c → d → b → a
- (D) b → d → c → a



Pyramid of Energy

(98) What is 'x', 'y' indicate in given diagram ?

- (A) x= decomposition,      y = respiration
- (B) x= energy                  y = decomposition
- (C) x = respiration          y = decomposition
- (D) x= decomposition      y = energy



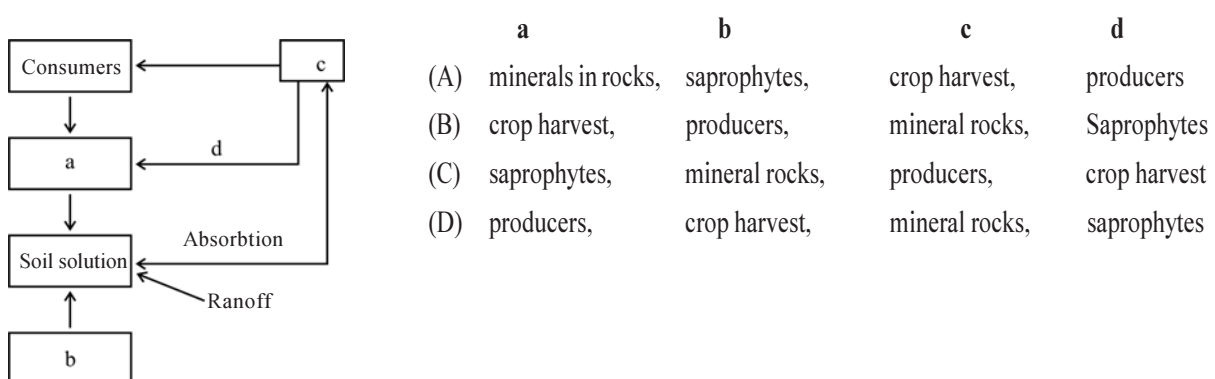
Single Channel energy flow



- (111) Bulk CO<sub>2</sub> fixation occurs in ..... .  
 (A) Crop plants (B) oceans  
 (C) Tropical rain forests (D) Temperate forests
- (112) If we completely remove the decomposers from an ecosystem, its functioning will be adversely affected because ..... .  
 (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
- (113) The primary succession refers to the development of communities on a ..... .  
 (A) freshly 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
- (114) Which of the following is the most stable ecosystem ?  
 (A) Forest (B) Desert (C) Mountain (D) Ocean
- (115) In a biotic community the primary consumers are ..... .  
 (A) carnivores (B) omnivores (C) detritivores (D) herbivores
- (116) Which of the following pairs is a sedimentary type of biogeochemical cycle ?  
 (A) Oxygen and nitrogen (B) Phosphorus and sulphur  
 (C) Phosphorus and nitrogen (D) Phosphorus and carbon dioxide
- (117) In a food chain the largest population is that of ..... .  
 (A) decomposers (C) primary consumers  
 (B) producers (D) tertiary consumers
- (118) 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 ..... .  
 (A) 5 % (B) 10 % (C) 25 % (D) 50 %
- (119) Which of the following ecosystems has highest rate of gross primary production ?  
 (A) Grass lands (B) Coral reefs  
 (C) Mangroves (D) Equatorial rain forest
- (120) The rate at which light energy is converted to the chemical energy of organic molecules is the ecosystem's ..... .  
 (A) net primary productivity (B) gross primary productivity  
 (C) net secondary productivity (D) gross secondary productivity
- (121) What is true of ecosystem ?  
 (A) Primary consumers are least dependent upon producers.  
 (B) Primary consumers outnumber producers.  
 (C) Producers are more than primary consumers.  
 (D) Secondary consumers are the largest and most powerful.



- (132) Consider the following statements concerning food chains.
- Removal of 80% tigers from an area resulted in greatly increase growth of vegetation.
  - Removal of most of the carnivores resulted in an increased population of deers.
  - The length of food chain is generally limited to 3-4 trophic levels due to energy loss.
  - The length of food chain may vary from 2 to 8 trophic levels.
- (133) Which one of following types of organisms occupy more than one trophic level in a pond ecosystem?
- (A) Fish                      (B) Zooplankton                      (C) Frog                      (D) Phytoplankton
- (134) The biomass available for consumption by the herbivores and decomposers is called .....
- (A) net primary productivity                      (B) secondary productivity  
(C) standing crop                      (D) gross primary productivity
- (135) Which are of following statements for pyramid of energy is incorrect, whereas the remaining three are correct ?
- Its base is broad.
  - It shows energy content of different trophic level organisms.
  - It is inverted in shape.
  - It is upright in shape.
- (136) Which one of following animals may occupy more than one trophic levels in the same ecosystem at same time ?
- (A) Sparrow                      (B) Lion                      (C) Goat                      (D) Frog
- (137) Both hydrarch and xerarch successions lead to .....
- medium water conditions                      (B) xeric conditions  
(C) highly dry conditions                      (D) excessive net conditions
- (138) If storage energy at producer level is 20J, so what mole of energy is available in a food chain ?
- (A) 0.02J                      (B) 0.002J                      (C) 0.2J                      (D) 0.0002J
- (139) Given chart shows phosphorous cycle. What does a, b, c, d indicates in given diagram ?



**Answers : (100-B), (101-B), (102-C), (103-A), (104-C) (105-C), (106-C), (107-B), (108-C), (109-A), (110-B), (111-D), (112-C), (113-D), (114-D), (115-D), (116-B), (117-B), (118-B (119-D), (120-B), (121-B), (122-A), (123-C), (124-B), (125-A), (126-C), (127-A), (128-A), (129-C), (130-D), (131-D), (132-A), (133-A), (134-A), (135-C), (136-A), (137-A), (138-A), (139-C)**

