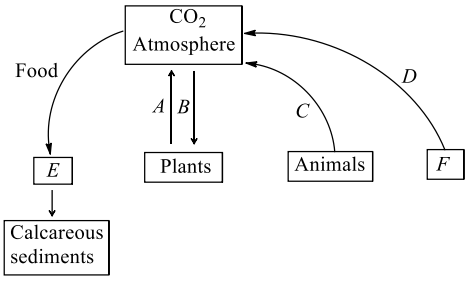
ECOSYSTEM

BIOLOGY

Single Correct Answer Type

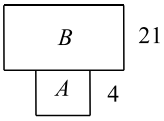
1. Which ecosystem has the highest gross primary productivity
   a) Rainforests b) Coral reefs c) Mangroves d) Grass lands
2. In primary succession in water, the pioneer species are
   a) Free floating angiosperm b) Small phytoplanktons
   c) Rooted hydrophytes d) Lichens
3. The pyramid of biomass will be inverted in the ecosystem of
   a) Forests b) Ponds c) Grasslands d) Drylands
4. Complete the following model of carbon cycle filling A, B, C, D, E and F



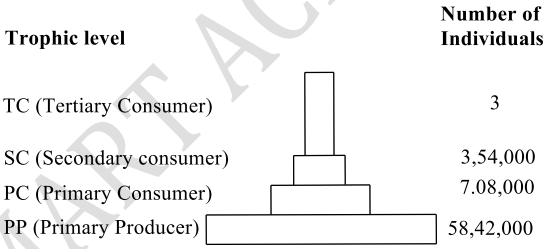
   a) A-Osmosis, B-Photosynthesis, C-Respiration, D-Burning of fuel wood, E-Forest food chain, F-Limestone
   b) A-Photorespiration, B-Respiration, C-Respiration, D-Burning of organic debris, E-Pond food chain, F-Dolomite
   c) A-Respiration, B-Photosynthesis, C-Respiration, D-Combustion of fossil fuels, E-Aquatic food chain, F-Coal, oil
   d) A-Respiration, B-Photosynthesis, C-Respiration, D-Burning of forest, E-Terrestrial food chain, F-Forest
5. Large unit of land having different types of plants and animals, is called
   a) Uniform vegetation b) Biome c) Ecosystem d) Niche
6. Which of the following is known as the sedimentary cycle because its reservoir is a sedimentary rock?
   a) Carbon cycle b) Hydrologic cycle c) Nitrogen cycle d) Phosphorus cycle
7. In ecological succession the communities in near equilibrium with the environment, are called
   a) Climax communities b) Ecofriendly communities
   c) Seral communities d) Pioneer communities
8. Dried plant parts such as leaves, bark, flowers, etc., and dead remains of animals including faecal matter, drop over the soil, constitute
   I. below ground detritus
   II. above ground detritus
   III. litter fall
   Choose the correct option
   a) I and II b) I and IV c) II and III d) I and III
9. In the following, there is no difference.
   a) Trophic level-I and herbivores b) Primary consumers and herbivores
   c) Primary carnivores and trophic level-II d) Secondary consumer and herbivores
10. Consider the following statements about carbon cycle
    I. Carbon is released into the atmosphere
    II. The atmospheric input of carbon from rainfall is greater
    III. Carbon gas is exchanged between organisms and atmosphere during respiration
    Which of the statement given above are correct?

a) I and II b) I and III c) II and III d) I, II and III

11. Ecological pyramids were discovered by
    a) Elton b) Odum c) Reiter d) None of these
12. Plant successions occurring in a sandy area is
    a) Psammosere b) Hydrosere c) Xerosere d) Lithosere
13. An ecosystem is
    a) Different communities of plants, animals and microbes interact together with their physico-chemical environments
    b) Different communities of plants and microbes interact with their physico-chemical environments
    c) A localised assemblage of several plants and animals
    d) An assemblage of plants, animals and their surroundings
14. What do ecologists call the transfer of energy that begins with the sun and passes from one organism to the next in a food chain?
    a) A food web b) A top consumer
    c) Energy flow d) A pyramid of number
15. The energy invested in the production of new tissue by autotrophic organisms is termed
    a) Gross primary production b) Decomposition
    c) Gross photosynthetic activity d) Net primary production
16. Microbes that breakdown the complex organic matter into simple substances like carbon, nitrogen, water, etc., are
    a) Producers b) Decomposers c) Consumers d) Symbionts
17. Which one of the following is no used for construction of ecological pyramids?
    a) Dry weight b) Number of individuals
    c) Rate of energy flow d) Fresh weight
18. Which element is formed by the weathering of rocks and absorbed by plant from the soil?
    a) Phosphorus b) Carbon c) Nitrogen d) Oxygen
19. Given diagram represents a pyramid of biomass in an aquatic system

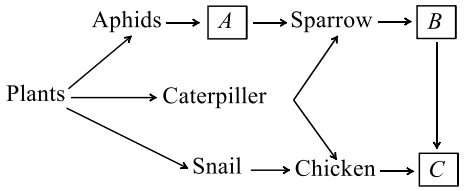


    Identifies *A* of *B* and select correct options
    a) A is phytoplanktons and B is zooplanktons b) A is zooplanktons and B is phytoplanktons
    c) A is smally body animals d) B is small body animals
20. Given below is one of the types of ecological pyramids



    This type represents
    a) Pyramid of number in a grassland ecosystem b) Pyramid of energy in forest ecosystem
    c) Pyramid of biomass in sea ecosystem d) Pyramid of biomass in terrestrial ecosystem
21. The process of breaking down complex organic matter into inorganic substances like CO_2, water and nutrient is called
    a) Humification b) Mineralisation c) Decomposition d) Leaching
22. Series of changes in structure and comparition of communities on previously barren area is
    a) Sere b) Climax community c) Primary succession d) Secondary succession
23. Energy transferred from on trophic level to another is
    a) 5% b) 10% c) 15% d) 20%

24. When the two ecosystems overlap each other, the areas is called
    a) Habitat b) Niche c) Ecotone d) Ecotype
25. The total amount of nutrients like carbon, phosphorus, calcium, etc., present in soil at any time is called
    a) Standing crop b) Standing state c) Nutrient crops d) Sediment
26. A food web is more realistic than a food chain for showing the feeding relationships in an ecosystem because
    a) It compares the number of consumers to the number of microorganisms in an ecosystem
    b) Food chains use only a small sampling of organisms
    c) A food web explains why there are more producers than consumers
    d) Producers are usually eaten by many different consumers and most consumers are eaten by more than one predator
27. Identify *A*, *B* and *C* from the given flow chart



    a) A-Bulbul, B-Snake, C-Monkey b) A-Beetle, B-Lizard, C-Praying mantis
    c) A-Ladybird, B-Snake, C-Hawk d) A-Lizard, B-Bird, C-Snake
28. Which of the following ecological pyramid are always inverted?
    a) Pyramid of number in parasific food chain and pyramid of biomass in pond ecosystem
    b) Pyramid of number in pond ecosystem and pyramid of biomass in pond ecosystem
    c) Pyramid of number in pasific food chain and pyramid of number in pond ecosystem
    d) All of the above
29. An individual transitional communities in ecological succession are termed as
    a) Climax community b) Pioneer community c) Seral communities d) Single community
30. The living organisms present in an ecosystem forms
    a) Abiotic components b) Biotic components
    c) Physical components d) Chemical components
31. The rate of biomass production per unit area over a time period by plants during photosynthesis is called
    a) Gross primary productivity b) Net primary productivity
    c) Secondary productivity d) Decomposition
32. The decomposition rate is higher when detritus is rich in
    a) Nitrogen and sugar b) Phosphorus and sugar
    c) Calcium and sugar d) Both (b) and (c)
33. A man-made ecosystem is
    a) Less in diversity b) More in diversity
    c) Man does not make ecosystem d) More stable than natural ecosystem
34. The green plants in an ecosystem which can trap solar energy to convert it into chemical bond energy are called
    a) Producer b) Decomposer c) Consumer d) Predators
35. Vegetable eating person acts as
    a) primary producer b) primary consumer c) secondary consumer d) tertiary consumer
36. Consider the following statements about food chain
    I. The transfer of energy from producers to top consumers through a series of organisms is called food chain
    II. A food chain is always straight and proceeds in a progressive straight line
    III. In a food chain, there is unidirectional flow of energy from sun to producers and subsequently to series of different types of consumers
    Which of the statements given above are correct?
    a) I and II b) I and III c) II and III d) I, II and III

37. Food chain consists of
a) Plants b) Herbivores c) Carnivores d) All of these

38. Consider the following ecosystem
I. Pond ecosystem II. Terrestrial ecosystem
III. Oceans ecosystem IV. Forest ecosystem
There are mainly three food chain in natural ecosystem's grazing food chain, detritus food chain, parasite food chain
Find out which of the following will have grazing food chain?
a) Pond ecosystem b) Terrestrial ecosystem c) Ocean ecosystem d) All of these

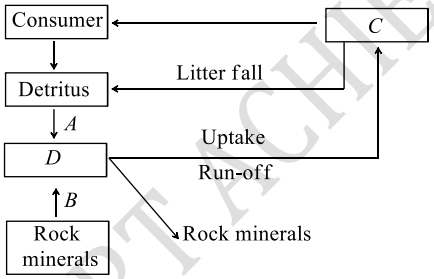
39. A much large fraction of energy flows in aquatic ecosystem through
a) grazing food chain b) Detritus food chain c) Complex food chain d) Food web

40. Consider the following statements concerning food chains.
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 to 4 trophic levels due to energy loss.
IV. The length of food chains may vary from 2 to 8 trophic levels.
Which two of the above statements are correct?
a) II and III b) III and IV c) I and IV d) I and II

41. Consider the following statements about food web
I. One organism hold more than one position
II. The flow of energy is very difficult to calculate
III. Instead of straight line it is a series of branching lines
IV. Competition is amongst the members of same and different trophic levels
Which of the statements given above are correct?
a) I, II and III b) I, III and IV c) II, III and IV d) I, II, III and IV

42. The statement, 'Tiger is in the apex of food chain', indicates
a) Tiger has many enemies
b) Tiger has maximum biomass
c) Tiger is omnivorous
d) Tiger is dependent upon large number of herbivores and even more number of trees in forest

43. Simplified model of phosphorus cycling in a terrestrial ecosystem is given below. Identify *A*, *B*, *C* and *D*



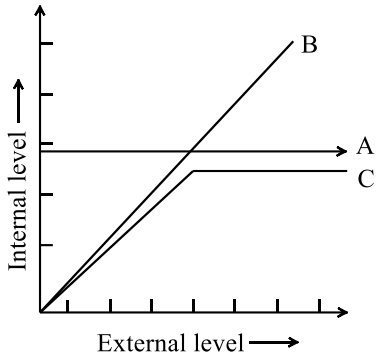
a) A-Weathering, B-Decomposition, C-Consumer, D-Soil
b) A-Decomposition, B-Weathering, C-Producer, D-Soil
c) A-Weathering, B-Decomposition, C-Decomposer, D-Soil
d) A-Decomposition, B-Decomposer, C-Weathering, D-Soil

44. Primary productivity is affected by
I. temperature
II. sunlight
III. moisture
IV. availability of nutrients
a) I and II b) I, II and III c) II, III and IV d) I, II, III and IV

45. Terai forest is
a) Tropical forest b) Coniferous forest

c) Deciduous forest d) Temperate deciduous forest

46. The figure given below is a diagrammatic representation of response of organisms to abiotic factors. What do A, B and C represent respectively?

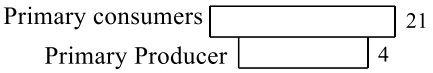


	A	B	C
a)	Conformer	Regulator	Partial regulator
b)	Regulator	Partial regulator	Conformer
c)	Partial Regulator	Regulator	Conformer
d)	Regulator	Conformer	Partial regulator

47. The ecological niche of population is a
    a) Geographical area that it covers b) Place where it lives
    c) Set of conditions and resource it uses d) None of the above
48. Inverted pyramid is found in
    a) Biomass pyramid of aquatic system b) Energy pyramid of grassland
    c) Biomass pyramid of grassland d) Pyramid of number of aquatic system
49. If a predator is overexploits its prey in a ecosystem then what might be consequences of this?
    a) Prey might be extinct b) Predator might be extinct
    c) Both (a) and (b) d) No affect on prey and predator
50. Which of the following organisms form the decomposers?
    a) *Pteris* b) Bacteria c) Saprophytic fungi d) Both (b) and (c)
51. Osmotrophs belong to
    a) Primary consumers b) Secondary consumers c) Top carnivores d) Decomposers
52. Greater primary productivity depends upon
    a) Rain (humidity) b) Availability of nutrients
    c) Both (a) and (b) d) None of these
53. Word detritus includes
    a) Dead plant parts b) Remains of animals c) Animal excretions d) All of these
54. Decomposition of organic matter is brought about by
    a) Protozoa b) Plants c) Microorganisms d) None of these
55. Some of the stages in the hydrarch are labelled as
    I. Marsh meadow stage
    II. Reed swamp stage
    III. Submerged plant stage
    IV. Phytoplankton stage
    V. Submerged free floating plant stage
    Identify the choice that represents the correct sequence of these stages
    a) IV, III, V, II and I b) III, V, I, II and IV c) II, IV, III, I and V d) IV, V, III, II and I
56. The correct sequence of food chain is
    a) Grass → insect → bird → snake b) Grass → bird → insect → snake
    c) Snake → bird → insect → grass d) Grass → snake → bird → insect
57. When the number of organisms at successive levels are plotted they assume the shape of a pyramid. This is called the pyramid of

a) Biomass b) Number c) Energy d) None of these

58. Which kind of pyramid is represented by the given diagram

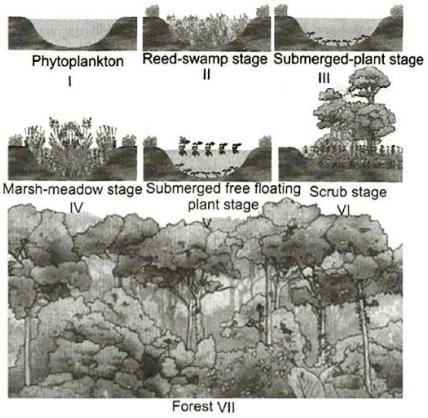


a) Pyramid of number in tree ecosystem
b) Pyramid of biomass in tree ecosystem
c) Pyramid of biomass in aquatic ecosystem
d) Pyramid of energy in tree ecosystem

59. In ecotone, some species become abundant called
a) Sibling species b) Endemic species c) Rare species d) Edge species

60. Ecosystem may be defined as
a) A species along with environment
b) Plants found in water
c) Plants found on land
d) All plants and animal species along with their environment

61. Following are the different stages in primary succession in water



Which of the following is the logical sequence of primary succession in water?
a) II → IV → V → VII → I → III → V
b) I → III → V → II → IV → VI → VII
c) V → II → IV → VI → VII → III → I
d) VI → VII → III → I → V → II → IV

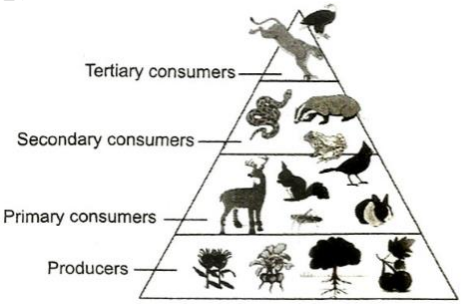
62. Energy flow and energy transformation in living systems strictly conform to the
a) Law of limiting factors
b) Liebig's law of minimum
c) Law's of thermodynamics
d) Shelford's law of tolerance

63. Phosphorus is required for making
I. shell
II. bones
III. teeth
Choose the correct option
a) I and II b) I and III c) II and III d) I, II and III

64. The species that invade a bare area in ecological succession are called
a) Benthos b) Biological species c) Seral species d) Pioneer species

65. In a pond ecosystem, benthos means
a) Primary consumers in the depth of a pond
b) Virus
c) Zooplankton on the water surface
d) Bacteria

66. The given figure best represents



a) Pyramid of number in parasitic food chain
b) Pyramid of biomass in forest ecosystem

c) Pyramid of number in grassland ecosystem d) Pyramid of number in forest ecosystem

67. Decomposers are
a) Autotrophs b) Autoheterotrophs c) Organotrophs d) Heterotrophs

68. The lentic ecosystem includes
a) Gravitational water b) Standing water c) Rain water d) Running water

69. Primary succession on rocks starts with
a) Lichen b) Grass c) Mosses d) Ferns

70. Energy storage at consumer level is called
a) Gross primary productivity b) Secondary productivity
c) Net primary productivity d) Net productivity

71. True/False
I. The total organic matter synthesised by the producers in the process of photosynthesis per unit time and area is known as gross primary productivity
II. Net primary productivity is the weight of the organic matter stored by the producers in a unit area/volume per unit time
a) I is true while II is false b) II is true, while I is false
c) I and II are true d) I and II are false

72. Lion is kept under in Eltonian pyramid as
a) Producer b) Primary consumer c) Secondary consumer d) Tertiary consumer

73. Maximum primary productivity of pond is achieved by
a) Phytoplankton b) Zooplankton c) Floating plants d) Red algae

74. What is the medium by which carbon cycle takes place?
a) Through atmosphere b) Through ocean
c) Through living and dead organisms d) All of the above

75. …… temperature is required for the proper functioning of an enzyme. The most appropriate word
a) Low b) High c) Optimum d) None of the above

76. In ecological pyramid the base always represent the …A… and the apex represents …B… Here A and B represents
a) A-producers; B-top level consumers b) A-top level consumer; B-producers
c) A-producers; B-secondary consumers d) A-producers; B-primary consumers

77. Maximum net productivity in the terrestrial ecosystem is in
a) Rain forest b) Deciduous forest
c) Mangrove plantation d) Both (a) and (b)

78. The primary consumers in a pond ecosystem are
a) Phytoplankton b) Zooplankton c) Fishes d) Bacteria

79. Which of the following factor is contributing to an overload of the carbon cycle?
a) Photosynthesis b) Cellular respiration c) Deforestation d) Aforestation

80. Which ones are the reservoirs of sulphur and carbon cycles respectively?
a) Atmosphere and consumers b) Earth crust and atmosphere
c) Earth crust and producer d) Atmosphere and predator

81. Ecosystem consists of
a) Producers b) Consumers c) Decomposers d) All of these

82. Trophic level of food chain having greatest amount of energy, is
a) Carnivores b) Herbivores c) Autotrophs d) Omnivores

83. The entire sequence of communities that successively changes in a given area are called
a) Sere b) Climax c) Pioneer d) Xerarch

84. Energy flow in ecosystem is
a) Bidirectional b) Unidirectional c) All around d) None of these

85. A bear that eats a fish that further ate bugs that ate algae is a
a) Primary producer b) Primary consumer c) Secondary consumer d) Tertiary consumer

86. Acid secreted lichens on baren rock helps in

I. dissolving rocks
II. weathering
III. soil formation
Which of the statements given above are correct?
a) I and II b) I and III c) II and III d) I, II and III

87. Ecological succession is
a) Directional but unpredictable b) Directionless but predictable
c) Directional but predictable d) Directionless but unpredictable

88. Which one of the following pairs is mismatched?
a) Savanna - *Acacia* trees b) Prairie - Epiphyte
c) Tundra - Permafrost d) Coniferous forest - Evergreen

89. In an ecosystem, the cycling of nutrient is known as
a) Geological cycle b) Chemical cycle c) Geochemical cycle d) Biogeochemical cycle

90. The aquatic organism that can actively swim at will against the water current is
a) Neuston b) Plankton c) Nekton d) Benthos

91. Green plants and green sulphur bacteria, prepare their organic food themselves with the help of sunlight, are known as
a) Chemoautotrophs b) Photoautotrophs c) Heterotrophs d) Chemotrophs

92. The movement of nutrient elements through various components (abiotic and biotic) of an ecosystem is called
a) Carbon cycle b) Geochemical cycle c) Biogeochemical cycle d) Chemical cycle

93. Biotic community along with its interacting physical environment comprises
a) Phytosociology b) Phytogeography c) Ecosystem d) Ecology

94. The relation between producers and consumers in an ecosystem can be graphically represented in the form of a pyramid called
a) Ecological pyramid b) Tropical level c) Pi chart d) Pyramid of biomass

95. Energy stored at the consumer level is
a) Primary productivity b) Secondary productivity
c) Net primary productivity d) Productivity

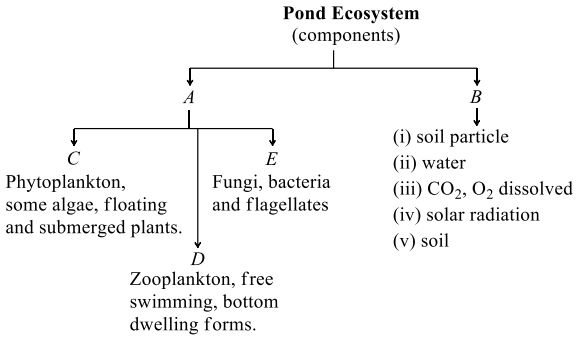
96. Actively moving organisms in aquatic ecosystem are
a) Nekton b) Benthos c) Viruses d) None of these

97. The secondary succession is easy and is completed quickly, because the area
a) Already has soil and some vegetation b) Is soilless
c) Is barren d) None of the above

98. Gross primary productivity is utilised by …A… in …B…
Choose the correct option for A and B
a) A-plants; B-photosynthesis b) A-plants; B-respiration
c) A-animal; B-respiration d) A-animal; B-digestion

99. What will happen if all the bacteria and fungi are destroyed?
a) There will be no disease and death
b) No antibiotics would become available
c) Dead bodies and excretions will pile up
d) Soil will become rich of all nutrients

100. A simplified model of pond ecosystem is given below. Identify A, B, C, D and E and choose the correct option



a) A-Biotic, B-Abiotic, C-Autotrophs, D-Heterotrophs, E-Detritivores
b) A-Biotic, B-Abiotic, C-Producer, D-Primary consumers, E-Detritivores
c) A-Abiotic, B-Biotic, C-Producer, D-Consumers, E-Detritivores
d) A-Biotic, B-Chemical, C-Primary consumers, D-Secondary consumers, E-Tertiary consumers

101. Abiotic components refers to
a) Non-living physico-chemical factors
b) Living physico-chemical factors
c) Gases produced by industries
d) Living organisms

102. Which of the following ecological pyramids can never occur in an inverted from
a) Pyramid of number
b) Pyramid of biomass
c) Pyramid of energy
d) Pyramid of species richness

103. Identify the correct type of food chain.
Dead animal → Blow fly maggots → Common frog → Snake
a) Grazing food chain
b) Detrital food chain
c) Decomposer food chain
d) Predator food chain

104. Which of the following is expected to have the highest value ($gm/m^2/yr$) in a grassland ecosystem?
a) Secondary production (SP)
b) Tertiary production (TP)
c) Gross production (GP)
d) Net production (NP)

105. Ecosystem is
a) Always open
b) Always closed
c) Both open and closed depending upon community
d) Both open and closed depending upon biomass

106. Which of the following pair is a sedimentary type of biogeochemical cycle?
a) Carbon and nitrogen
b) Phosphorus and sulphur
c) Phosphorus and nitrogen
d) Phosphorus and oxygen

107. Tropical dense forests are due to
a) Low rainfall and low temperature
b) High rainfall and low temperature
c) Low rainfall and high temperature
d) High rainfall and high temperature

108. In a lake, phytoplankton grow I abundance in
a) Littoral zone
b) Limnetic zone
c) Profundal zone
d) Benthic region

109. At each step of food chain when food energy is transferred from one trophic level to the next higher trophic level only about 10% of energy is passed onto next level. This is known as …A… given by …B… in …C… . Here A, B and C Refers to
a) A-Energy flow law, B-Lindeman, C-1942
b) A-10% law, B-Lindeman, C-1942
c) A-Energy flow law, B-Lipemann, C-1940
d) A-10% law, B-Lipemann, C-1940

110. The process of accumulation of a dark coloured amorphous substance that is highly resistant to microbial action and undergoes decomposition at an extremely slow rate is called
a) Mineralisation
b) Humitication
c) Organisation
d) Transformation

111. Total energy fixed by an ecosystem is called
a) Primary production
b) Gross production
c) Net production
d) Secondary production

112. A detrivore is

a) Animal feeding on plant matter
b) Animal feeding on dead and decaying organic matter
c) A plant feeding on an animal
d) Animal feeding on another animal

113. All the animals that depend on plants for food are called
a) Decomposers b) Root feeders c) Consumers d) Grazers

114. Regarding the mode of obtaining food, the organisms occurring in an ecosystem are classified into plants, animals and microorganisms. These are respectively called
a) Producer, consumers and decomposers
b) Primary, secondary and tertiary consumers
c) Consumers, producer and decomposers
d) Autotrophs, heterotrophs and producers

115. Out of the following biogeochemical cycles which one is gaseous?
I. sulphur II. Phosphorus
III. nitrogen IV. Carbon
Choose the correct option
a) Only I b) Only II c) Only IV d) III and IV

116. The amount of living matter present in an ecosystem at a given time is called
a) Biomass b) Standing crop c) Standing state d) Productivity

117. In a food chain, the maximum population of
a) Producers b) Primary consumers c) Secondary consumer d) Tertiary consumers

118. Overlapping region between two ecosystems is called
a) Biome b) Ecotone c) Niche d) Photic zone

119. The major functions of an ecosystem includes
I. productivity II. Decomposition
III. energy flow IV. Nutrient flow
Choose the correct option
a) I, II and III b) II, III and IV c) I, III and IV d) I, II, III and IV

120. Most diverse organism of an ecosystem is
a) Producer b) Consumer c) Decomposer d) Carnivore

121. In grazing food chain energy comes from
a) Organic remain b) Air c) Water d) All of these

122. The amount of usable energy, which is available for doing work, when the temperature and pressure are uniform throughout the system is called
a) Enthalpy b) Activation energy c) Spontaneous energy d) Free energy

123. Which one of the following is correct for xerarch succession?
a) Successional series from xeric to mesic condition b) Successional series from hydric to mesic condition
c) Both (a) and (b) d) None of the above

124. Biotic components refer to
a) Gases produced by industries b) Nutrient-deficient soil
c) Living organisms d) Fossil fuels

125. Which one of the following is correct matching of a plant, its habitat and the forest type where it normally occurs?
a) *Prosopis,* tree, scrub b) *Saccharum officinarum*, grass, forest
c) *Shorea robusta*, herb, tropical rain forest d) *Acacia catechu*, tree, coniferous forest

126. Select the options that correctly identifies *A*, *B* and *C* in the given table

Organisms	Trophic Level	Types of Food Chains
Eagle	*A*	Grazing
Earthworm	Primary consumer	*B*

C	Secondary consumer	Grazing

a) A-Secondary consumer, B-Grazing, C-Algae
b) A-Top carnivore, B-Detritus, C-Frog
c) A-Scavenger, B-Grazing, C-Hawk
d) A-Decomposer, B-Detritus, C-Perch

127. What is common in earthworm, soil mites and dung beetle in an ecosystem?
a) They all are detritivores
b) Primary consumer
c) Secondary consumer
d) Tertiary consumer

128. Which one of the following is involved in sedimentary cycle?
a) Carbon b) Nitrogen c) Hydrogen d) Phosphorus

129. Which of the following pyramid is always upright and can never be inverted?
a) Pyramid of biomass b) Pyramid of number c) Pyramid of energy d) Both (a) and (c)

130. Choose the correct statements
I. Productivity is expressed in $gm^{-2}yr^{-1}$ or $(kcal\ m^{-2})yr^{-1}$
II. The amount of biomass or organic matter produced per unit area over a time period in plants during photosynthesis is called primary production
III. Primary production is expressed in term of weight (g^{-2}) or energy ($kcal\ m^{-2}$)
IV. Sugarcane have more efficiency to trap sunlight, so they accumulate more primary productivity
Choose the correct option
a) I and II b) I and IV c) I, II, III and IV d) None of these

131. The 10% law is related to
a) Mendelian genetics
b) Non-Mendelian genetics
c) Energy transfer from lower trophic to higher trophic level
d) Energy consumption during photosynthesis in C_4-plants

132. Which of the following two organisms are producers?
a) Plants and phytoplanktons
b) Plants and consumers
c) Zooplanktons and phytoplanktons
d) Phytoplanktons and chlorophyll

133. Consider the succession of plants
I. In hydrarch succession series progress from hydric to the mesic condition
II. In xerarch succession series progress from xerarch to the mesic condition
III. In xerarch succession if it is started on bare rock the pioneer species is lichens
IV. In hydrarch and xerarch succession series progress from mesarch to xerarch condition
Which of the following is correct combination match from above statements?
Choose the correct option
a) II and III b) III and IV c) II and IV d) I, II and III

134. Which creatures are direct or indirect food of all creatures on the ocean's surface?
a) Protozoans b) Phytoplankton c) Fish d) Aquatic insects

135. An inverted pyramid of …A… may occasionally be observed in …B… communities
a) A-energy; B-grassland
b) A-energy; B-forest
c) A-biomass; B-marine
d) A-biomass; B-grassland

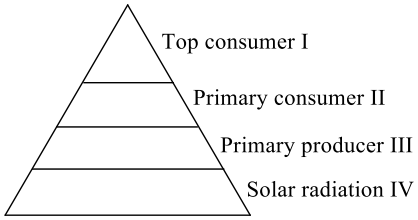
136. Which one of the following is not a functional unit of an ecosystem?
a) Productivity b) Startification c) Energy flow d) Decomposition

137. Which one of the following types of organisms occupy more than one trophich level in a pond ecosystem?
a) Phytoplankton b) Fish c) Zooplankton d) Frog

138. Humus is
a) Dark coloured amorphous organic matter rich in lignin
b) Dark coloured organic matter rich in cellulose
c) Both (a) and (b)
d) Red coloured substances rich in iron

139. In terrestrial ecosystem such as forest, maximum energy is found in which tropic level?
a) T_1 b) T_2 c) T_3 d) T_4

140. Frog, that feeds on insects, is a
a) Primary consumer b) Secondary consumer
c) Tertiary consumer d) Decomposer
141. The organisms, which attack dead animals are
a) First link of the food chain and are known as primary producers
b) Second link the food chain and are herbivorous
c) Third link of the food chain and are tertiary consumers
d) Present at the end of food chain and are detrivores
142. Pyramid of energy in aquatic ecosystem is
a) Always upright b) Always inverted c) Bell-shaped d) None of these
143. Consider the following statements about ecological pyramids
I. Charles Elton developed the concept of ecological pyramid
II. After the name these pyramids are also called as Eltonian pyramids
III. It is a graphical representation or pyramid shaped diagram which depicts the number of organisms, biomass and energy at each trophic level
Which of the statements given above are correct?
a) I and II b) I and III c) II and III d) I, II and III
144.



I. 10 kcal/m^2/yr II. 100 kcal/m^2/yr
III. 1000 kcal/m^2/yr IV. 100000 kcal/m^2/yr
Refer to the above diagram of energy pyramid. The ecological efficiency at primary consumer level, in comparison to that at secondary consumer level, is
a) Same b) More
c) Less d) Cannot be ascertained from the data
145. Which of the following pyramid of numbers in ecology is not upright?
a) Pond ecosystem b) Desert ecosystem c) Tree ecosystem d) Forest ecosystem
146. A lion that eats a zebra that ate grass is a
a) Primary producer b) Primary consumer
c) Secondary consumer d) Quaternary consumer
147. Pyramids of biomass in pond ecosystem is
a) Inverted
b) Upright
c) Linear
d) Irregular
148. The process of which humus is degraded by some microbes to release inorganic nutrients is known as
a) Mineralization b) Humification
c) Photophosphorylation d) Pollination
149. The process of mineralisation by microorganisms helps in the release of
a) Inorganic nutrients from humus
b) Both organic and inorganic nutrients from detritus
c) Organic nutrients from humus
d) Inorganic nutrients from detritus and formation of humus
150. Which of the following plants develop characters of xerophytes?
a) Heliophytes b) Sciophytes c) Hydrophytes d) Halophytes
151. Which one of the following statements is correct for secondary succession?
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

152. Phytoplanktons are found in which of the following zones?
a) Limnetic zone b) Secondary consumers
c) Littoral zone d) Aphotic zone

153. The role of a cow in a food chain is
a) Primary consumer b) Heterotroph c) Herbivores d) All of these

154. Which of the following are the essential sources for releasing CO_2 in the atmosphere?
I. Burning of wood
II. Volcanic activity
III. Combustion of organic matter
IV. Fossil fuels
Choose the correct option
a) I, II and III b) II, III and IV c) I, III and IV d) I, II, III and IV

155. Source of energy in an ecosystem is
a) Sun b) ATP c) Sugar made by plant d) Green plant

156. Consider the following statements about limitations of ecological pyramids
I. It never takes into account the same species belonging to two or more trophic levels
II. It assumes a simple food chain, which never exists in nature
III. In split of the vital role played by saprophytes/decomposers, they are not given any position in ecological pyramids
Which of the statements given above are correct?
a) I and II b) I and III c) II and III d) I, II and III

157. Which of the following always has a pyramidal shape, that is, decreasing values at higher trophic levels?
a) Pyramids of number b) Pyramids of biomass
c) Both (a) and (b) d) Pyramids of energy

158. Identify the plant belonging to the reed-swamp stage in hydrarch succession
a) *Juncus* b) *Sagittaria* c) *Salix* d) *Trapa*

159. Secondary productivity is
a) The rate of formation of new organic matter by consumers
b) Greater than primary productivity
c) 5% less than primary productivity
d) Equal to the gross primary productivity

160. Extinction of a species in a food chain is compensated by
a) Food chain b) Ecological pyramid c) Food web d) None of these

161. The changes that occur in successive seral stages to reach a climax community are
I. changes in the diversity of species of organisms
II. increase in the number of species and organisms
III. increase in the total biomass
Choose the correct option
a) I and II b) I and III c) II and III d) I, II and III

162. Which one of the following is a gaseous cycle?
a) Sulphur cycle b) Phosphorus cycle c) Nitrogen cycle d) All of these

163. Which of the following statements are correct?
I. Least productive ecosystems are deserts and deep lakes
II. Sugarcane is the most productive crop
III. Most productive ecosystem is coral reef
Choose the correct option
a) I and II b) I and III c) II and III d) I, II and III

164. Pyramid of energy in ecosystem is

a) Always upright b) Always inverted c) Mostly upright d) Mostly inverted

165. A plant is
a) An autotroph b) A heterotroph c) A primary producer d) Both (a) and (c)

166. Ecosystem having the highest primary productivity is
a) Pond b) Ocean c) Desert d) Forest

167. The Great Barrier Reef along the east coast of Australia can be categorized as
a) Population b) Community c) Ecosystem d) Biome

168. A much smaller fraction of energy flows in a terrestrial ecosystem through
a) Grazing food chain b) Detritus food chain
c) Complex food chain d) Food web aquatic ecosystem

169. …A… is required for higher primary productivity. …B… have the lowest primary productivity as the soil is deficient in moisture.
Choose the correct option for A and B
a) A-Rain; B-desert b) A-Heat; B-forest c) A-Rain; B-forest d) A-Forest; B-desert

170. Driving force of any ecosystem is
a) Organic fuels and carbohydrates b) Biomass
c) Solar energy d) Decomposers

171. Climax community is
a) Stable b) Self perpetuating
c) Final biotic community d) All of these

172. Stratification occurs in
a) Desert b) Tropical forest c) Deciduous forest d) Tundra

173. Plant species having a wide range of genetical distribution evolve into a local population known as
a) Ecotype b) Biome c) Ecosystem d) Population

174. Regarding 10% law
I. This law was put forward by Lindeman in 1942
II. According to this law, during the transfer of food energy from one tropical level to the other, only about 10% is stored at higher trophic level and the remaining 90% is lost in respiration, decomposition and waste in the form of heat
Which of the statements given above is/are correct?
a) Only I b) Only II c) I and II d) None of these

175. Ecological succession is a
a) Long term process b) Very fast process c) Short term process d) Migration

176. At which latitude, heat gain through insolation approximately equals heat loss through terrestrial radiation?
a) 66° North and South b) $22\frac{1}{2}°$ North and South
c) 40° North and South d) $42\frac{1}{2}°$ North and South

177. Rabbits eats grass and other plants to survive, but they do not eat animals. Refer the best category for rabbits?
a) Decomposers b) Carnivores c) Producers d) Herbivores

178. If we completely remove the decomposers from an ecosystem, its functioning will be adversely affected because
a) Herbivores will not receive solar energy b) Mineral movement will be blocked
c) The rate of decomposition will be very high d) Energy flow will be blocked

179. To show how many organisms are present at each level of a food chain, ecologists use a model called
a) An energy flow pyramid b) Pyramid of numbers
c) Pyramid of energy d) Food chain/food web pyramid

180. Competition for food, light and space is most severe between two
a) Closely related species growing in different niches
b) Distantly related species growing different niches

c) Closely related species growing in same niches
d) Distantly related species growing in same niches

181. What human activities are responsible increase to the amount of CO_2 in the atmosphere?
a) Deforestation
b) Massive burning of fossil fuels
c) Vehicle for energy
d) All of the above

182. The reservoir for the gaseous type of biogeochemical cycle exists in
a) Stratosphere b) Atmosphere c) Ionosphere d) Lithosphere

183. Autotrophs
a) Make their own food
b) Are the base of the food chain
c) Are primary producers
d) All of the above

184. An ecosystem, which can be easily damaged but can recover after some time if damaging effect stops, will be having
a) Low stability and high resilience
b) High stability and low resilience
c) Low stability and low resilience
d) High stability and high resilience

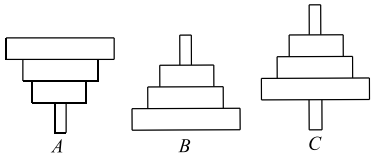
185. Which of the following ecosystem types has the highest annual net primary productivity?
a) Tropical rain forest
b) Tropical deciduous forest
c) Temperate evergreen forest
d) Temperate deciduous forest

186. In pond ecosystem, diatoms represent
a) Producers b) Primary consumer c) Secondary consumer d) Tertiary consumer

187. The importance of ecosystem lies in
a) Cycling of materials b) Flow of energy c) Both (a) and (b) d) Its biomass

188. Two species occupying same or overlapping area are called as
a) Sympatric b) Allopatric c) Parapatric d) Ring species

189. Which of the following representations show the pyramid of numbers in a grassland ecosystem?

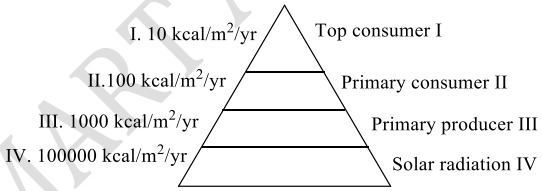


a) A b) B c) C d) None of these

190. Choose the area which will take minimum time for succession
a) Newly created reservoir
b) Bare rock
c) Buried or cut forest
d) Newly cooled lava

191. Each tropical level has a certain mass of living material at a particular time called
a) Standing crop
b) Biomass
c) Branching lines
d) Progressive straight line

192. What is the rate of secondary production in the energy pyramid given below?



a) Uncertain b) 100 kcal/m^2/yr c) 10 kcal/m^2/yr d) 110 kcal/m^2/yr

193. Energy transfers or transformation are never 100% efficient. This is due to
a) Entropy b) Homeostasis c) Catabolism d) Anabolism

194. The process by which water soluble inorganic nutrients go down into the soil horizon and get precipitated as unavailable salts is called as
a) Fragmentation b) Leaching c) Catabolism d) Mineralization

195. The nature of climax community in ecological succession in most dependent upon
a) Climate b) Water c) Soil fertility d) None of the above

196. Group of two or more than two plant species is called as
a) Plant community b) Animal ecosystem c) Plant ecosystem d) Ecological niche

197. The products of decomposition process are
a) Humus b) Inorganic nutrients c) Organic nutrients d) Both (a) and (b)
198. The reservoir for the sedimentary cycle exists in
a) Earth crust b) Organic sediments c) Calcareous sediments d) Limestone
199. Standing crop refers to
a) All the photosynthetic living forms in an area
b) All he living forms in an area
c) The amount of living matter in a component population of an ecosystem at any time
d) All the crop plants in an area
200. Nektons are
a) Organisms that swim in water b) Floating plants
c) Suspended lower plants d) Animals associated with plants
201. Vertical distribution of different species occupying different levels in an ecosystem is called
a) Stratification b) Decomposition c) Fragmentation d) Humification
202. Fill in the missing stages (A to D) in the given primary hydrarch succession.
Phytoplankton → (A) → (B) → (C) → Marsh-meadow stage → (D) → Forest plant stage
a) A-Read-swamp-stage, B-Sub-merged plant stage, C-Sub-merged free-floating plant stage, D-Scrub stage
b) A-Sub-merged plant stage, B-Sub-merged free-floating plant stage, C-Read-swamp-stage, D-Scrub stage
c) A-Scrub stage, B-Sub-merged plant stage, C-Read-swamp-stage, D-Sub-merged free-floating plant stage
d) A-Read-swamp stage, B-Scrub stage, C- Sub-merged plant stage, D-Sub-merged free floating plant stage
203. A community that starts the process of succession in a barren habitat is called
a) Emotional community b) Climax community
c) Seral community d) Pioneer community
204. How much incident sun radiation on earth is utilised by producers (plants)?
a) 0.01 b) 0.001 c) 1 d) 2
205. Percentage of Photosynthetically Active Radiation (PAR) that is captured by plants in synthesis of organic matter is
a) 50-80% b) 40-60% c) 70-100% d) 2-10%
206. The term 'homeostasis' in an ecosystem refers to
a) Feedback mechanism b) Self regulatory mechanism
c) Influence of production d) State of equilibrium
207. Trophic level in ecosystem is formed by
a) Only bacteria b) Only plants
c) Only herbivores d) Organisms linked in food chain
208. Which one of the following is a sedimentary cycle?
a) Sulphur cycle b) Nitrogen cycle c) Carbon cycle d) Oxygen cycle
209. Select the matched ones.
I. Sedimentary nutrient - Nitrogen cycle
II. Pioneer species - Lichens
III. Secondary succession - Burned forests
IV. Pyramid of biomass in sea - Upright
a) I, II and IV only b) I and III only c) II and III only d) II and IV only
210. Which of the following is an example of man-made ecosystem?
a) Herbarium b) Aquarium c) Tissue culture d) Forest
211. PAR stands for
a) Photosynthesis Active Reaction b) Photosynthesis Absorb Radiation
c) Photosynthetically Active Radiation d) Photosynthetically Active Reaction
212. The sunlight directly regulates the primary productivity because
a) Gross primary productivity is utilised by plants in respiration
b) The plants perform respiration with the help of sunlight
c) The plants perform photosynthesis with the help of sunlight

d) None of the above

213. What is the reason behind deficit rising in nutrient reservoir?
a) Due to imbalance in the rate of influx
b) Due to imbalance in the rate of efflux
c) Due to imbalance in the rate of influx and efflux
d) None of the above

214. "Complete competitiors cannot coexist" is true for
a) Character displacement
b) Competitive exclusion
c) Primary succession
d) Secondary succession

215. In a comparative study of grassland ecosystem and pond ecosystem, it may be observed that
a) The biotic components are almost similar
b) The abiotic components are almost similar
c) Primary and secondary consumers are similar
d) Both biotic and abiotic components are different

216. Food chain refers to
a) Number of humans forming a chain for food
b) Animals gathered near a source of food
c) Transfer of energy from producers to consumers
d) None of these

217. A person who eats a chicken that ate grain is a
a) primary producer
b) primary consumer
c) secondary consumer
d) quaternary consumer

218. Pyramid that is never inverted
a) Energy
b) Mass
c) Number
d) Size

219. Major ecological community of plants and animals extending over large natural areas is known as
a) Bioregion
b) Biosphere
c) Biota
d) Biome

220. In a pyramid of numbers in a grassland ecosystem, the largest population is that of
a) Producers
b) Tertiary consumers
c) Secondary consumers
d) Primary consumers

221. The exchange pool in the carbon cycle is
a) Fossil fuels
b) Sedimentary rock
c) Water
d) Atmosphere

222. Primary productivity is
I. is 10% less than secondary productivity
II. is the rate of formation of new organic matter by consumers
III. is expressed in terms of weight or energy
IV. is the amount of biomass or organic matter produced per unit area over a time period in plants during photosynthesis
Which of the statements given above are correct?
a) I, II and III
b) I and II
c) III and IV
d) II and IV

223. Which of the following is false?
a) Quantity of biomass is a trophich level at a particular period is called as standing crop
b) The energy content in a trophic level is determined by considering individuals of a species in that trophic level
c) The succession that occurs in newly cooled lava is called primary succession
d) Rate of succession is faster in secondary succession

224. These belong to the category of primary consumers.
a) Snakes and frogs
b) Water insects
c) Eagle and snakes
d) Insects and cattle

225. Total amount of living material at the various trophic level of a food chain is depicted by pyramids of
a) Numbers
b) Energy
c) Biomass
d) All of the above

226. Primary productivity depends upon
a) Availability of nutrients
b) Photosynthetic capacity of plants
c) Both (a) and (b)
d) None of the above

227. Consider the following statements
I. Producer are also called as transducers because they are able to change radiant energy into chemical form
II. Consumers are animals, which feed on other organisms or their parts

III. Decomposers are saprotrophs, which feed on dead bodies of organisms
Which of the statements given above are correct?
a) I, II and III b) I and II c) I and III d) II and III

228. Only a small amount of the energy stored in food is available to the next organism in a food chain because
a) There are more producers than consumer in a food chain
b) There are fewer top consumers than producers in a food chain
c) Primary and secondary consumers compete for food
d) Most of the energy is used for life processes

229. The process of accumulation of a dark coloured …A… substance called …B… that is highly resistant to microbial action and undergoes decomposition at an extremely slow rate is called …C…
Choose the correct option for A, B and C
a) A-amorphous, B-humus, C-humification
b) A-solid, B-minerals, C-mineralisation
c) A-water soluble, B-inorganic nutrients, C-leaching
d) A-enzymatic, B-detritus, C-catabolism

230. In autogenic succession,
a) Early and continued dominance of autotrophic organism takes place like green plants
b) Replacement of existing communities cause largely by any other external condition
c) Early dominance of heterotrophs takes place such as bacteria, fungi and other animals
d) Community itself modifies its own environments thus causing its own replacement by new communities

231. Which of the following communities is more vulnerable to invasion by outside animals and plants?
a) Temperate forests b) Tropical evergreen
c) Oceanic island communities d) Mangroves

232. The average trophic efficiency of transfer of energy from one trophic level to the higher trophic level is called
a) Assimilation efficiency b) Exploitation efficiency
c) Lindemann's trophic efficiency rule d) Gross primary production

233. The two components of an ecosystem are
a) Plants and animals b) Weeds, trees, animals and man
c) Energy flow and mineral cycling d) Biotic and abiotic

234. The food chain which begin with dead organic matter is called
a) Detritus food chain b) Predator food chain c) Parasitic food chain d) Ecosystem

235. The rate of formation of new organic matter by rabbit in a grassland is called
a) Net productivity b) Secondary productivity
c) Net primary productivity d) Gross primary productivity

236. The sequence of communities showing a gradual change in composition is called
a) Continuum b) Bio indicator c) Succession d) Pyramid of number

237. Which of the following is the logical sequence of primary succession in water?
a) Small phytoplanktons → Free-floating angiosperms → Rooted hydrophytes → Sedges → Grasses → Trees
b) Free-floating angiosperms → Small phytoplanktons → Rooted hydrophytes → Grasses → Sedges → Trees
c) Small phytoplanktons → Sedges → Free floating angiosperms → Rooted hydrophytes → Grasses → Trees
d) Small phytoplanktons → Sedges → Grasses → Free-floating angiosperms → Rooted hydrophytes → Trees

238. In an aquatic ecosystem, the trophic level equivalent to cows in grasslands is
a) Phytoplankton b) Zooplankton c) Nekton d) Benthos

239. Energy for the detritus food chain comes from
a) Organic remain b) Air c) Radiation d) Water

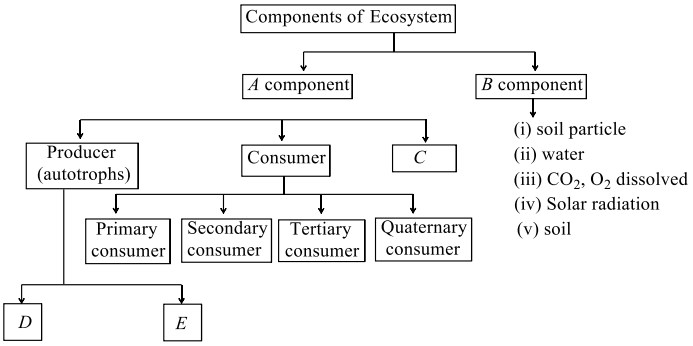
240. The organic substance, which decompose slowly are
a) Chitin b) Lignin c) Cellulose d) All of these

241. Stability of ecosystem depends upon
a) Primary productivity

b) Interchange between producers and consumers
c) Number of producers
d) Number of consumers

242. Mr. X is eating curd/yoghurt. For this food intake in a food chain, he should be considered as occupying
a) First trophich level
b) Second trophic level
c) Third trophic level
d) Fourth trophic level

243. Study the diagram carefully and fill in the blanks



Choose the correct option for A, B, C, D and E
a) A-Biotic, B-Abiotic, C-Decomposers, D-Photoautotrophs, E-Chemoautotrophs
b) A-Physical, B-Chemical, C-Phytoplanktons, D-Plants, E-Parasites
c) A-Biotic, B-Abiotic, C-Decomposers, D-Autotrophs, E-Mixotrophs
d) A-Physical, B-Chemical, C-Bacteria and Fungi, D-Autotrophs, E-Heterotrophs

244. A pyramid of number in grassland ecosystem shows
a) There are always a large number of producers at the bottom and fewer top consumers
b) There are always a large number of top consumers and fewer producers
c) There are an equal number of producers and consumers
d) There are more top consumer than primary consumers

245. Phosphorus is needed for the production of
a) DNA and RNA
b) Cellular membranes
c) Bones and teeth
d) All of these

246. Which of the following statement is true about ecosystem?
a) The term 'ecosystem' was coined by Sir AG Tansley
b) The size of the ecosystem varies from small pond to a large forest or sea
c) In a forest ecosystem, trees occupy top vertical strata or layer, shrubs occupies the second layer and herbs and grasses occupies the bottom layers
d) All of the above

247. Which food chain correctly describes the flow of energy in an ecosystem?
a) Grass → cow → human
b) Caterpillar → leaf → human
c) Cow → grass → human
d) Leaf → bird → caterpillar

248. Phosphorus is the major constituent of
I. biological membranes
II. nucleic acids
III. cellular energy transfer system
Choose the correct option
a) I and II
b) I and III
c) II and III
d) I, II and III

249. The biomass available for consumption by the herbivores and the decomposers is called
a) Net primary productivity
b) Secondary productivity
c) Standing crop
d) Gross primary productivity

250. 'Sun basket' is
a) The device to utilize sun rays directly to meet the requirement of heat energy
b) The sufficient amount of sunlight stored in a cell
c) A device of taking sunbath
d) All of the above

251. In a grazing food chain carnivores may also the referred to as
a) Primary producers
b) Secondary producers
c) Primary consumers
d) Secondary consumers

252. In a food chain, the total amount of living material is depicted by
a) Pyramid of biomass b) Pyramid of energy c) Pyramid of number d) Trophic levels

253. In an ecosystem, the insectivorous plants are placed in
a) Herbivores b) Primary producers c) Predators d) None of these

254. Find the correct statement
a) Low temperature and aerobic conditions inhibit decomposition
b) Plants capture only 2-10%, of the PAR and sustain the entire living world
c) In aquatic and terrestrial ecosystems the GFC is the major conduit for energy flow
d) Measurement of biomass in terms of fresh weight is more accurate than dry weight

255. The rate of which organic compounds are formed in a green plant or in a population of green plants per unit time and area is known as the
a) Net primary productivity b) Gross primary productivity
c) Community productivity d) Secondary productivity

256. The correct sequence of plants in a hydrosere is
a) Oak $\rightarrow$ *Lantana* $\rightarrow$ *Scirpus* $\rightarrow$ *Pistia* $\rightarrow$ *Hydrilla* $\rightarrow$ *Volvox*
b) *Volvox* $\rightarrow$ *Hydrilla* $\rightarrow$ *Pistia* $\rightarrow$ *Scirpus* $\rightarrow$ *Lantana* $\rightarrow$ Oak
c) *Pistia* $\rightarrow$ *Volvox* $\rightarrow$ *Scirpus* $\rightarrow$ *Hydrill* $\rightarrow$ Oak $\rightarrow$ *Lantana*
d) Oak $\rightarrow$ *Lantana* $\rightarrow$ *Volvox* $\rightarrow$ *Hydrilla* $\rightarrow$ *Pistia* $\rightarrow$ *Scirpus*

257. A sequence of species or organism through which the food energy pass in a community is called
a) Pyramid of energy b) Food chain c) Food web d) Nutrient cycle

258. Detritus food chain law accounts for more energy flow than garzing food chain because
a) Most organisms die without having being eaten
b) Most organisms do not die
c) Most organisms having being eaten
d) None of the above

259. Select the formula for ecological efficiency.
a) $\frac{\text{Gross primary productivity}}{\text{Incident total solar radiatio}} \times 100$
b) $\frac{\text{Food energy assimilated}}{\text{Food energy ingested}} \times 100$
c) $\frac{\text{Net primary productivity}}{\text{Gross primary productivity}} \times 100$
d) $\frac{\text{Energy in biomass production at trophic level}}{\text{Energy in biomass production at previous trophic level}} \times 100$

260. Primary consumers are
a) Carnivores b) Herbivores c) Decomposers d) Omnivores

261. A functional aspect of an ecosystem is
a) Productivity and decompositions b) Energy flow and nutrient cycling
c) Both (a) and (b) d) None of the above

262. Consider the following statements
I. In a food chain one organism holds only one position
II. In a food chain the flow of energy can be easily calculated
III. In food chain competition is limited to the members of same trophic level
Which of the statements given above are correct?
a) I, II and III b) I and II c) I and III d) II and III

263. What is the percentage of Photosynthetically Active Radiation (PAR), if incident solar radiation is considered 100%?
a) 100% b) 1-6% c) 2-20% d) 50%

264. Choose the wrong pair.
a) *Salvadora* – Desert
b) *Cenchrus* – Savanna
c) *Abies* – Coniferous forest
d) *Tectona* – Temperate forest

265. Which is an example of true pyramid in an ecosystem?
a) Pyramid of a biomass
b) Pyramid of number
c) Pyramid of energy
d) None of the above

266. The minimum number of components required for an ecosystem to survive
a) Producer and primary consumer
b) Producer and decomposer
c) Primary consumer and decomposer
d) Primary and secondary consumer

267. The 10% energy transfer law of food chain was given by
a) Lederberg
b) Lindemann
c) Weismann
d) Lindley

268. In plant succession, when climax community is reached, the net productivity
a) Continues to increase
b) Becomes zero
c) Becomes reduced
d) Becomes stable

269. In plant succession, when climax is reached, the net productivity
a) Continues to increase
b) Becomes halved
c) Becomes stable
d) Becomes zero

270. The transition zone between two communities is known as
a) Ecotone
b) Keystone species
c) Edge effect
d) Critical link species

271. Primary productivity is
a) The rate of formation of new organic matter by consumers
b) The rate of conversion of light into chemical energy in an ecosystem
c) The rate of energy production per unit area over a time period during photosynthesis
d) None of the above

272. In food chain, maximum energy is stored in
a) Producer
b) Primary consumer
c) Secondary consumer
d) Decomposer

273. Consider the following statements about pyramid of biomass
I. When we plot the biomass (net dry weight) of producers, herbivores, carnivores and so on we have a pyramid of biomass
II. Two types of pyramid of biomass are found, *i. e*., upright and inverted
III. When larger weight of producers support a smaller of biomass weight of consumers an upright pyramid results
IV. When smaller weight of producers support larger weight of consumers an inverted pyramid of biomass is formed
Which of the statements given above are correct?
a) I, II and III
b) I, III and IV
c) II, III and IV
d) I, II, III and IV

274. The final stable community in ecological succession is
a) Pioneers
b) Sere
c) Climax
d) Carnivores

275. In what order do a hawk, grass and rabbit form a food chain in a meadow?
a) Hawk → grass → rabbit
b) Grass → hawk → rabbit
c) Rabbit → grass → hawk
d) Grass → rabbit → hawk

276. Pond is defined as a
a) Biome
b) Agroecosystems
c) Natural ecosystem
d) Community

277. What is the amount of carbon fixed in biosphere through photosynthesis annually?
a) 4×10^{13}kg
b) 5×10^{13}kg
c) 4×10^{16}kg
d) 5×10^{16}kg

278. Find out the correct order of succession levels in xerarch.
a) Lichen, moss stage, annual herb stage, perennial herb stage, scrub stage, forest
b) Annual herb stage, perennial herb stage, lichen, moss stage, scrub stage, forest
c) Perennial herb stage, annual herb stage, lichen, moss stage, scrub stage, forest
d) Scrub stage, forest, annual herb stage, perennial herb stage, lichen, moss stage

279. Niche is defined as the
a) Position of species in a community in relation to other species

b) Place where organism lives
c) Place where organism lives and performs its duty
d) Place where population perform their duties

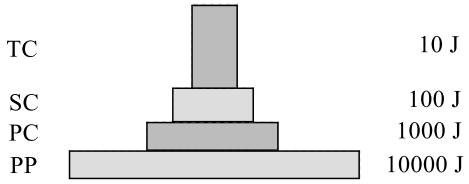
280. In the phosphorus cycle, weathering makes phosphate available first to
a) Producers b) Decomposers c) Consumers d) None of these

281. Most stable ecosystem is
a) Desert b) Marine c) Mountain d) Forest

282. Which of the following is wrongly matched?
a) Temperate zone - $20 - 40°$ latitude
b) Hypolimnion - Thermal stratification in lakes
c) Ozone layer - Stratosphere
d) Profundal zone - Dark zone

283. The factors influencing the rate of decomposition are
a) Temperature b) Moisture c) Both (a) and (b) d) Catabolism

284. Given below is the diagram of the ecological pyramids



This type represents
a) Pyramid of number in a grassland b) Pyramid of biomass in a lake
c) Pyramid of biomass in a land d) Pyramid of energy

285. Decomposers like fungi and bacteria are
I. autotrophs
II. heterotrophs
III. saprotrophs
IV. chemoautotrophs
Choose the correct option
a) I and II b) I and IV c) II and III d) I and III

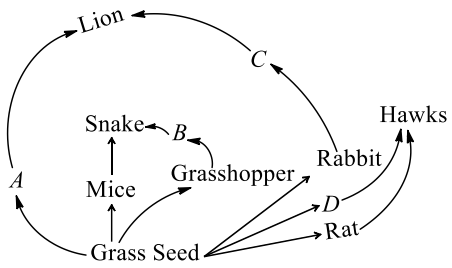
286. Which of the following groups is absolutely essential functional component of the ecosystem?
a) Producers b) Producers and herbivores
c) Producers and detritivores d) Detritivores

287. Lichens that start the succession on a rock belongs to
a) Climax community b) Intermediate community
c) Pioneer community d) Seral community

288. Peacock eats a snake and snake eats frog and frog eats insect while insect eats green plant, the position of peacock is
a) Primary producer b) Secondary producer
c) Decomposer d) Top at the apex of food pyramid

289. The enzymatic process by which degraded detritus is converted into simpler inorganic substances is called
a) Catabolism b) Leaching c) Mineralisation d) Fragmentation

290. Given food web contains some missing organisms A, B, C and D. Identify these organisms and select the correct answer



a) A-Deer, B-Frog, C-Foxes, D-Sparrow
b) A-Dog, B-Squirrel, C-Deer, D-Hawks
c) A-Cat, B-Eagle, C-Cow, D-Rat
d) A-Eagle, B-Sparrow, C-Dog, D-Cat

291. Consider the following statements
I. The pyramid of biomass is inverted in a pond ecosystem
II. Pyramid of energy is never inverted
III. Pyramid of number is inverted in a tree ecosystem
IV. Pyramid of biomass in forest ecosystem is upright
Which of the statements given above are correct?
a) I, II and III
b) I, III and IV
c) II, III and IV
d) I, II, III and IV

292. Plants which are attached to the rocks are called
a) Lithophytes
b) Aerophytes
c) Halophytes
d) Psammophytes

293. Community is a group of independent and interacting population of
a) Different species
b) Same species
c) Same species in a specific area
d) Different species in a specific area

294. The ecological pyramid that is always upright
a) Pyramid of energy
b) Pyramid of biomass
c) Pyramid of number
d) None of these

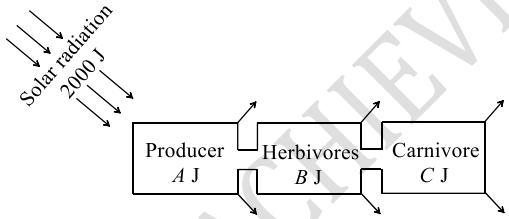
295. The sequential, gradual and predictable changes in the species compositions in an area are called
a) Seral community
b) Climax community
c) Ecological succession
d) Pioneer species

296. Food chain is a series of population, which starts with producers. It is concerning with
a) Biotic components only
b) Energy flow and transfer of nutrients
c) Both (a) and (b)
d) Abiotic components and decomposers

297. The total amount of energy that plants assimilate by photosynthesis is called
a) Gross primary productivity
b) Net primary productivity
c) Community productivity
d) Secondary productivity

298. One model that shows how energy passes from one trophic level to another trophic level is called
a) An energy link
b) A food chain
c) A phytoplankton cycle
d) Photosynthesis

299. Suppose 2000 J of solar energy is incident on green vegetation. On the basis of 10% law of Lindeman. Identify A, B and C



a) A-20 J, B-2 J, C-0.2 J
b) A-200 J, B-20 J, C-2 J
c) A-400 J, B-40 J, C-4 J
d) A-40 J, B-4 J, C-0.4 J

300. In an ecosystem, in which an organism occupies a specific place in a food chain
a) Branching lines
b) Progressive straight line
c) Trophic level
d) Standing crop

301. Pollution caused by persistent pesticides is relatively more hazardous to which type of organisms?
a) Herbivores
b) First level carnivores
c) Producers
d) Top carnivores

302. All are true for climax community except
a) Rapidly keeps on changing to reach equilibrium
b) Final community
c) End of succession
d) Stable

303. Productivity is the rate of production of biomass expressed in terms of
I. $(\text{kcal m})^{-3}\text{yr}^{-1}$
II. $\text{g}^{-2}\text{yr}^{-1}$
III. $\text{g}^{-1}\text{yr}^{-1}$
IV. $(\text{k cal m}^{-2})\text{yr}^{-1}$
Choose the correct option

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

304. Excessive moisture inhibit the process of decomposition due to
a) Anaerobiasis b) Aerobiasis
c) Photoxidation d) Photophosphorylation

305. Select the true statements
I. Gross primary productivity is equal to the net primary productivity minus respiration
II. Gross primary productivity is equals to net primary productivity plus photosynthesis
III. Net primary productivity is equal to photosynthesis plus respiration
IV. Net primary productivity is equal to gross primary productivity minus respiration
V. Flow of energy in an ecosystem is unidirectional
a) I, II and III b) I, IV and V c) II and III d) IV and V

306. Which of the following statements regarding food chain is false?
a) In an aquatic ecosystem, grazing food chain is the major conduit for energy flow
b) In terrestrial ecosystems, a large fraction of energy flows through detritus food chain
c) The detritus food chain begins with dead organic matter
d) Primary consumers belong to the first trophic level

307. Phytoplanktons
a) Actively floating microscopic plant b) Floating angiosperm
c) Benthic organisms d) Passively floating microscopic plant

308. Which of the following pair is a gaseous type of biogeochemical cycle?
a) Nitrogen and carbon cycle b) Phosphorus and carbon cycle
c) Nitrogen and sulphur cycle d) Sulphur and carbon cycle

309. Which zone of a lake has no photosynthetic organism?
a) Profundal zone b) Littoral zone c) Limnetic zone d) Both (b) and (c)

310. The second stage of hydrosere is occupied by the plants like
a) *Salix* b) *Vallisneria* c) *Azolla* d) *Typha*

311. If decomposers are removed what will happen to the ecosystem?
a) Energy cycle is stopped b) Mineral cycle is stopped
c) Consumers cannot absorb solar energy d) Rate of decomposition of mineral increases

312. If a single plant species is removed from a food web, then most likely
a) An animal species will fill the unoccupied niche
b) Other plants will produce enough food for herbivores
c) Dependent herbivores will have to find new food sources
d) Carnivores will be unaffected by the loss

313. Food chain starts with
a) N_2-fixation b) Osmosis c) Respiration d) Photosynthesis

314. Fungi in a forest ecosystem is
a) Producer b) Decomposer c) Top consumer d) Autotroph

315. The ultimate energy source of ecosystem is
a) Solar energy b) Biomass c) Producer d) Carbohydrates

316. Lichen is the pioneer vegetation on which succession?
a) Hydrosere b) Lithosere c) Psammosere d) Xerosere

317. Benthic organisms are found in
a) Surface of marine water b) Middle of water in sea
c) Bottom of sea d) On ground

318. Organisms that breakdown the detritus into matter particles are
a) Herbivores b) Carnivores c) Detritivores d) None of these

319. The assemblage of all the population of different species that function as an integrated unit through coevolved metabolic transformation in a specific area is called
a) Biome b) Biotic community c) Population d) Ecosystem

320. The organisms which physically and chemically breaks the complex dead organic remains are known as

a) Scavangers b) Decomposers c) Both (a) and (b) d) Parasites

321. Which of the following helps in the growth of terrestrial pteridophytes in tropical rain forest?
a) Microclimate b) C_4 −pathway
c) Eutrophication d) Biological magnification

322. Which one of the following shows detritus food chain?
a) Organic waste → Bacteria → Molluscs b) Grass → Insects → Snakes
c) Plankton → Small fishes → Large fishes d) All of the above

323. Energy enters the ecosystem through
a) Herbivore b) Carnivore c) Producer d) Decomposer

324. Deserts, grasslands, forests and tundra are the examples of
a) Biomes b) Biogeographical regions
c) Ecosystems d) Biospheres

325. Decomposers of an ecosystem includes
a) Microscopic animals b) Bacteria and fungi
c) Earthworm and Arctic Raven d) All of the above

326. The pyramid of energy is always upright for any ecosystem. This situation indicates the fact that
a) Producers have the lowest energy conversion efficiency
b) Carnivores have a better energy conversion efficiency than herbivores
c) Energy conversion efficiency is the same in all trophic levels
d) Herbivores have a better energy conversion efficiency than carnivores

327. Term 'ecosystem development' to ecological succession was given by
a) Odum b) Clements c) R Misra d) Blackman

328. Organisms are classified into trophic levels according to
a) Their habitat b) The source of their nutrients
c) How much they weight d) All of the above

329. The tiger biomass is 10 kg in grass-deer-tiger food chain. The grass biomass will be
a) 100 kg b) 2000 kg c) One tonne d) 10 tonne

330. Organisms living in open sea are called
a) Planktons b) Nektons c) Pelagic d) Benthos

331. Study the four statements (I-IV) given below and select the two correct ones out of them
I. A lion eating a deer and a sparrow feeding on grain are ecologically similar in being consumers.
II. Predator star fish *Pisaster* helps in maintaining species diversity of some invertebrates.
III. Predators ultimately lead to the extinction of prey species.
IV. Production of chemicals such as nicotine, strychnine by the plants are metabolic disorders.
a) II and III b) III and IV c) I and IV d) I and II

332. In food chain, lion is a
a) Tertiary consumer b) Secondary consumer
c) Primary consumer d) None of these

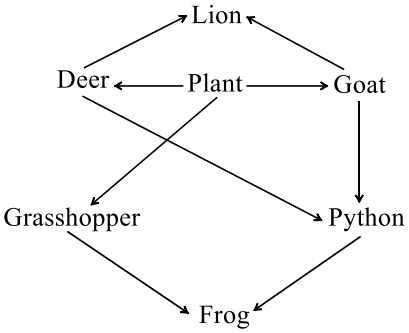
333. Building of biomass or storage of energy by green plants in a unit time and area is called
a) Productivity b) Net primary productivity
c) Gross primary productivity d) Primary productivity

334. Sal and teak are dominant in
a) Tropical rain forest b) Temperate broad leaf forest
c) Temperate needle leaf forest d) Tropical deciduous forest

335. Rate of conversion of light energy into chemical energy of organic molecules in an ecosystem is
a) gross primary productivity b) Net primary productivity
c) Net secondary productivity d) Gross secondary productivity

336. What percentage of heabivore's chemical energy is transferred to the chemical energy within the carnivore tissue?
a) 100% b) 50% c) 1% d) 10%

337. In which layer of soil decomposition occurs at maximum rate?
a) Upper layer of soil b) Middle layer of soil c) Lower layer of soil d) None of these

338. 

How many food chains are there in the food web shown above?
a) 2 b) 3 c) 5 d) 7

339. Which one of the following is one of the characteristics of a biological community?
a) Stratification b) Natality c) Mortality d) Sex ratio

340. In the given formula, what does 'a' represent?
$$\text{Assimilatory efficiency} = \frac{\text{Use of energy in food}}{\text{a}} \times 100$$
a) Energy obtained through primary producer b) Biomass at own level
c) Biomass at lower trophic level d) Energy obtained through food

341. Term 'ecosystem' was given by
a) Odum b) Koestler c) Tansley d) Mobius and Forbes

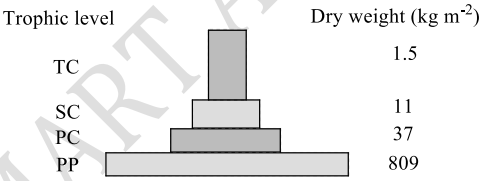
342. Most diverse organisms of an ecosystem are
a) Producers b) Consumers c) Carnivores d) Decomposers

343. Primary succession is the development of communities on
a) Cleared forest area b) Previously unoccupied sites
c) Fresh harvested crop field d) Pond filled after a day season

344. Select the incorrect food chain
a) Grass → frog → vulture
b) Grass → grasshopper → frog → snake → eagle
c) Grass → deer → lion
d) Phytoplankton → zooplankton → fish (perch) → fish (bass) → man

345. Which one of the following correctly represents as organism and its ecological niche?
a) *Vallisneria* and pond b) Desert locust (*Scistocerca*) and desert
c) Plant lice (aphids) and leaf d) Vultures and denes forest

346. Given below is one of the type of ecological pyramids

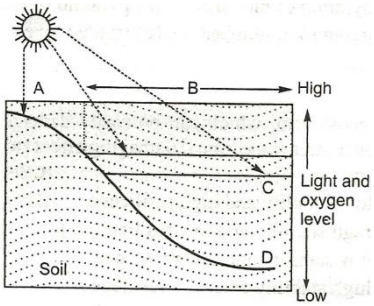


This type represents
a) Pyramid of energy in a grassland b) Pyramid of biomass
c) Pyramid of number in a lake d) Pyramid of energy in a fallow land

347. The pyramid of number of a parasitic food chain in tree ecosystem is
a) Always inverted b) Always upright
c) Mixture of inverted and upright d) Sometimes inverted and sometimes upright

348. Stratification is more pronounced in
a) Tropical rainforest b) Deciduous forest c) Temperate forest d) Tropical savannah

349. Choose the correct combination of labelling of the zones in water in a lake.



a) A- Limnetic zone B-Profundal zone C-Littoral zone D-Benthic zone
b) A- Littoral zone B-Benthic zone C-Profundal zone D-Limnetic zone
c) A- Littoral zone B-Limnetic zone C-Profundal zone D-Benthic zone
d) A- Limnetic zone B-Littoral zone C-Benthic zone D-Profundal zone

350. Breakdown of detritus into smaller particles by earthworm is a process called
a) Humification b) Fragmentation c) Mineralisation d) Catabolism

351. What is true about the phosphorus cycle?
I. Rocks are the natural reservoirs of phosphorus
II. Weathering of sedimentary rocks makes phosphate available to the soil
III. Herbivores and carnivores obtain phosphorus from plant directly or indirectly
Choose the correct option
a) I and II b) I and III c) II and III d) I, II and III

352. How much carbon is dissolved in the oceans?
a) 61% b) 71% c) 81% d) 51%

353. Broad-leaved forests of oak are found in
a) Tropical deciduous forest b) Tropical evergreen forest
c) Temperate deciduous forest d) North coniferous forest

354. The greatest biomass of autotrophs in the world's oceans is that of
a) Benthic brown algae, coastal red algae and daphnids
b) Benthic diatoms and marine viruses
c) Sea grasses and slime moulds
d) Free-floating micro-algae, cyanobacteria and nanoplankton

355. Which one of the following is commonly found in temperate coniferous forests?
a) *Quercus* b) *Dipterocarpus* c) *Shorea robusta* d) *Pinus wallichiana*

356. Littoral zone is located along the
a) High mountains b) Sea c) Rivers d) Desert

357. Biological equilibrium is found among the
a) Producers, consumers and decomposers b) Producers and consumers
c) Producers and decomposers d) None of the above

358. Net primary productivity is utilised by
a) Autotrophs b) Heterotrophs c) Decomposers d) All of the above

359. Which of the following is the logical sequence of primary succession in rocks?
a) Small bryophytes → Lichen → Herb → Shrubs → Tress → Forest
b) Lichen → Small bryophytes → Herbs → Shrubs → Tress → Forest
c) Lichen → Herb → Shrubs → small bryophytes → Tress → Forest
d) Herb → Shrubs → Lichen → Small bryophytes → Tress → Forest

360. Another name of nutrient cycling is
a) Gaseous cycle b) Sedimentary cycle c) Biogeochemical cycle d) Carbon cycle

361. Which one of the following statements for pyramid of energy is incorrect, whereas the remaining three are correct?
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

362. Transition zone between two ecosystems is

a) Ecotype b) Niche c) Ecotone d) Biome

ECOSYSTEM

BIOLOGY

: ANSWER KEY :

1)	b	2)	b	3)	b	4)	c	173)	a	174)	c	175)	a	176)	c
5)	b	6)	d	7)	a	8)	c	177)	d	178)	b	179)	b	180)	c
9)	b	10)	d	11)	a	12)	a	181)	d	182)	b	183)	d	184)	a
13)	a	14)	c	15)	d	16)	b	185)	a	186)	a	187)	c	188)	a
17)	d	18)	a	19)	b	20)	a	189)	b	190)	c	191)	a	192)	b
21)	c	22)	c	23)	b	24)	c	193)	d	194)	b	195)	a	196)	a
25)	b	26)	d	27)	c	28)	a	197)	d	198)	a	199)	c	200)	a
29)	c	30)	b	31)	a	32)	a	201)	a	202)	b	203)	d	204)	a
33)	a	34)	a	35)	b	36)	d	205)	d	206)	d	207)	d	208)	a
37)	d	38)	d	39)	b	40)	a	209)	c	210)	b	211)	c	212)	c
41)	d	42)	d	43)	b	44)	d	213)	c	214)	b	215)	b	216)	c
45)	b	46)	d	47)	c	48)	a	217)	c	218)	a	219)	d	220)	a
49)	c	50)	d	51)	d	52)	c	221)	d	222)	c	223)	b	224)	d
53)	d	54)	c	55)	a	56)	a	225)	c	226)	c	227)	a	228)	d
57)	b	58)	c	59)	d	60)	d	229)	a	230)	d	231)	b	232)	c
61)	b	62)	c	63)	d	64)	d	233)	d	234)	a	235)	b	236)	a
65)	a	66)	b	67)	c	68)	b	237)	a	238)	b	239)	a	240)	d
69)	a	70)	b	71)	c	72)	d	241)	b	242)	b	243)	a	244)	a
73)	a	74)	d	75)	c	76)	a	245)	d	246)	d	247)	a	248)	d
77)	a	78)	b	79)	c	80)	b	249)	a	250)	a	251)	d	252)	a
81)	d	82)	c	83)	a	84)	b	253)	b	254)	b	255)	b	256)	b
85)	d	86)	d	87)	c	88)	b	257)	b	258)	a	259)	d	260)	b
89)	d	90)	c	91)	b	92)	c	261)	c	262)	a	263)	d	264)	d
93)	c	94)	a	95)	b	96)	a	265)	c	266)	b	267)	b	268)	d
97)	a	98)	b	99)	c	100)	b	269)	c	270)	a	271)	b	272)	a
101)	a	102)	c	103)	b	104)	c	273)	d	274)	c	275)	d	276)	c
105)	a	106)	b	107)	d	108)	b	277)	a	278)	a	279)	c	280)	a
109)	b	110)	b	111)	b	112)	b	281)	b	282)	a	283)	c	284)	d
113)	c	114)	a	115)	d	116)	b	285)	c	286)	c	287)	c	288)	d
117)	a	118)	b	119)	d	120)	c	289)	a	290)	a	291)	d	292)	c
121)	b	122)	d	123)	a	124)	c	293)	d	294)	a	295)	c	296)	c
125)	a	126)	b	127)	a	128)	d	297)	a	298)	a	299)	a	300)	c
129)	c	130)	b	131)	c	132)	a	301)	d	302)	a	303)	c	304)	a
133)	d	134)	b	135)	c	136)	b	305)	d	306)	d	307)	d	308)	a
137)	b	138)	d	139)	a	140)	b	309)	c	310)	b	311)	b	312)	c
141)	d	142)	a	143)	d	144)	c	313)	d	314)	b	315)	a	316)	b
145)	c	146)	c	147)	a	148)	a	317)	c	318)	c	319)	b	320)	c
149)	a	150)	d	151)	a	152)	c	321)	a	322)	a	323)	c	324)	a
153)	d	154)	d	155)	a	156)	d	325)	b	326)	d	327)	a	328)	b
157)	d	158)	b	159)	a	160)	c	329)	c	330)	a	331)	d	332)	a
161)	d	162)	a	163)	d	164)	a	333)	b	334)	d	335)	a	336)	d
165)	d	166)	b	167)	c	168)	a	337)	a	338)	c	339)	a	340)	d
169)	a	170)	c	171)	d	172)	b	341)	c	342)	d	343)	b	344)	a

345)	**c**	**346)**	**b**	**347)**	**a**	**348)**	**a**	**357)**	**a**	**358)**	**b**	**359)**	**b**	**360)**	**c**
349)	**c**	**350)**	**b**	**351)**	**d**	**352)**	**b**	**361)**	**b**	**362)**	**c**				
353)	**c**	**354)**	**d**	**355)**	**d**	**356)**	**b**								

ECOSYSTEM

BIOLOGY

: HINTS AND SOLUTIONS :

1 **(b)**
Productivity is maximum in the because they grow in areas having good light and abundant nutrients

2 **(b)**
In primary succession in water the pioneer species are small phytoplanktons, *e*. *g*., diatoms, green flagellates, single-celled colonial or filamentous green algae

3 **(b)**
The amount of living matter present in an ecosystem is known as biomass. It is upright in case of tree, which supports a large number of birds and inverted in a pond where a large fish feeds upon a large number of phytoplanktons

4 **(c)**
A-Respiration, B-Photosynthesis, C-Respiration, D-Combustion of fossil fuels, E-Aquatic food chain, F-Coal, oil

5 **(b)**
Biomes are the major terrestrial ecosystems or distinctive terrestrial areas with their group of climax plants and associated animals It is the largest terrestrial community.

6 **(d)**
In the sedimentary cycle, the reservoir for the nutrient elements is in the sediments of the earth. Elements, such as phosphorus, sulphur, potassium and calcium have sedimentary cycle

7 **(a)**
Climax community is the stable, self perpetuating and final biotic community that develops at the end of biotic succession and is in perfect harmony with the physical environment. It is also termed as climatic climax community

8 **(c)**
Dried plant parts such as leaves bark, flower, etc., and dead remains of animals including faecal matter drop over the soil, constitute the above ground detritus and litter fall

9 **(b)**
Top carnivore (trophic level-IV or tertiary consumer)

↑

Primary carnivore (trophic level-III or secondary consumer)

↑

Herbivore (trophic level-II or primary consumer)

↑

Producers (trophic level-I)

10 **(d)**
The atmosphere carbon dioxide is virtually the only source of carbon. The main pathway of carbon in carbon cycle in from the air (atmosphere) and water (hydrosere) into the living systems and back
The atmospheric input of carbon from rainfall is greater. Carbon gas is exchanged between organism and atmosphere during respiration

11 **(a)**
Ecological pyramid is the graphic representation of the interaction of food chain and the size metabolism relationship between the lineally arranged various biotic components of an ecosystem. The concept of pyramid was proposed by **Charles Elton.**

12 **(a)**
Psammosere – Sequence of successional stages on sand
Lithosere – Sequence of successional stages on a bare rock
Hydrosere – The various stage of biotic succession taking place in water body are collectively termed as hydrosere
Xerosere – The series of development stages of biotic succession is an arid area is termed as xerosere

13 **(a)**
An ecosystem is the basic functional ecological unit in which living organisms interact among themselves and with their surrounding physical

environment

15 **(d)**

Net primary production.

Net primary productivity is the weight of the organic matter stored by the producers in a unit area/volume for unit time. It is given by NPP = GPP – R (Gross Primary Productivity) where, R = Respiration losses. It is utilised by hetertrophs

16 **(b)**

Decomposers or the microconsumers (bacteria and fungi) are also called as saprobes or saprophytes. They breakdown the complex organic substances of dead plants and animals to release most of inorganic substances back into the environment for their reuse by the producers

17 **(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 under

(i) **Pyramid of number**, showing the number of organisms at each level.

(ii) **Pyramid of biomass**, showing the total dry weight of living organisms.

(iii) **Pyramid of energy**, showing the rate of energy flow/productivity at successive trophic levels.

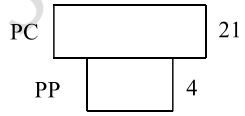
Thus, fresh weight is not used for the construction of ecological pyramids.

18 **(a)**

During weathering of rocks, minute amount of phosphates dissolve in soil solution and are absorbed by plants through roots

19 **(b)**

Pyramid of biomass is inverted in a pond, where a large number of zooplanktons eats upon a large number of phytoplanktons



Inverted pyramid of biomass where a small standing crop of phytoplanktons supports large standing crop of zooplanktons

20 **(a)**

Pyramids of number in grassland ecosystem.

The pyramid of numbers deal with the number of primary producers and consumers. It is upright in a grassland and inverted in a tree ecosystem. In a grassland the number of producers is more than the number of top carnivores, whereas in case of a tree, the number of producers is less as compared to consumers

21 **(c)**

Decomposition is the process of breaking down a substance into its constituent parts.

Decomposition of dead organic matter (plants, animals and waste products of animals) occurs in nature and it is also called decay or putrification.

In a terrestrial ecosystem, the upper layer of soil is the main site of decomposition

22 **(c)**

Primary succession.

Primary succession is a biotic succession that occurs on a previously sterile or primarily bare area, *e*. *g*., newly exposed sea floor igneous rocks, sand dunes, new cooled lava sediment, etc.

23 **(b)**

As per 'ten percent law' in an ecosystem, all energy is provided by sun through photosynthesis. Total energy stored by the autotrophs in the form of food is available to the herbivores as food. Herbivores can stored only 10% of this energy in their biomass and 90% is used in life activities and loss as heat. In the same way, herbivores are eaten by carnivores and carnivores by top carnivores. Thus, only 10% of energy is captured by the organisms of next higher trophic level.

24 **(c)**

Ecotone is a zone of transition presenting a situation of special ecological interest between two different type of communities (ecosystems).

Ecological niche of an organism includes the physical space occupied by it, its functional role in community, i.e., trophic level and position in environment gradients of temperature, pH, soil etc.

25 **(b)**

The total amount of nutrients like carbon, phosphorus, calcium, etc., present in soil at any given time is called standing state. Standing state varies with the kind of ecosystem, and season

26 **(d)**

Food webs are more realistic because they show that the producers are usually eaten by many different consumers and most consumers are

eaten by more than one predator

27 **(c)**
Plants → Aphids → Ladybird → Sparrow → Snake → Hawk

28 **(a)**
The pyramid of number of lake or pond ecosystem is always inverted, where a large fish eat large number of small zooplanktons and pyramid of number in parasitic food chain is also inverted a single small leaves can support large number of parasite

29 **(c)**
The various biotic communities that develop during biotic succession are termed as seral or transitional communities

30 **(b)**
The living organisms present in an ecosystem forms biotic components. They are interconnected through food chain

31 **(a)**
The rate of synthesis of organic matter or biomass, produced at any trophic level during a given period of time is called productivity. It is measured as weight $g^{-2}yr^{-1}$ or energy (kcal/ m^2/yr)

32 **(a)**
The decomposition rate is higher when detritus is rich in nitrogen and water-soluble substances like sugars

33 **(a)**
Artificial ecosystem is created and maintained by human beings. It has less diversity and less stability, *e.g.*, crop ecosystem.

34 **(a)**
Producers are autotrophs organisms, which alone are able to manufacture organic food from inorganic raw materials in the process of photosynthesis. The energy for this process is obtained from solar radiations or sunlight

35 **(b)**
Primary consumers in an ecosystems are herbivores, which feed directly on producer (green plants)

36 **(d)**
A food chain is a sequence of populations or organisms of an ecosystem through which the food and its contained energy passes with each member becoming the food of later member of sequence
It is a single straight pathway through which food energy travels in the ecosystem
Energy flow in an ecosystem is always unidirectional or one way, *i.e.,* Solar radiation → Producers → Herbivores → Carnivores. It can not pass in the reverse direction

37 **(d)**
The food chain consist of producers, consumers and decomposers. *Consumers are often of 3-5 types*
First order (Primary) – Herbivores
Second order (Secondary) – Primary carnivores
Third order (Tertiary) – Secondary carnivores
Fourth order (Quaternary) – Top carnivores

38 **(d)**
The grazing food chain is occurs in all the ecosystem

39 **(b)**
A much larger fraction of energy flows in aquatic ecosystem through the graizing food chain than through the grazing food chain. Energy for the food chain comes from organic remain or detritus

40 **(a)**
The series of organisms eating one and being eaten by other is called **food chain**. 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 energy loss. In grazing food chain, the producers (*i.e.,* plants) are eaten by herbivores (*i.e.*, rabbit, dear, cow, etc) and are eaten by carnivores. Therefore, the removal of most of the carnivores resulted in an increased population of deers.

41 **(d)**
A number of food chains are inter-connected with each other forming a web-like pattern is called food web. One organism can hold more than one position. The flow of energy is very difficult to calculate instead of straight line, it is a series of branching lines

42 **(d)**
Tiger is the top consumer in a food chain. It can feed upon lower carnivore as well as herbivores. Herbivores are dependent upon producers (*i.e.*, green plants) for their food. Thus, indirectly it is also linked with trees (*i.e.*, primary producers).

43 **(b)**
A-Decomposition, B-Weathering, C-Producer, D-Soil

44 **(d)**

Factor affecting primary productivity are as follows

(i) Plant species inhabiting a particular area

(ii) Environmental factors

1. **Sunlight** The sunlight directly regulates the primary productivity because the plants perform photosynthesis with the of sunlight. As trophic region receives maximum sunlight, so it exhibits higher productivity

2. **Temperature** Temperature regulates the activity of enzyme. So, optimum temperature is required for proper functioning of enzymes

3. **Moisture** Rain (humidity) is required for higher primary productivity. Deserts have the lowest primary productivity as the soil is deficient in moisture

4. **Availability of Nutrients** Greater nutrients ensures the greater primary productivity

5. Photosynthetic Efficiency Some plants have more efficiency to trap the sunlight (sugar cane), so they accumulate more primary productivity

45 **(b)**

Terai forests are coniferous forests occurring at an altitude of 1700-3000 m. Major trees are various species of *Pinus, Cedrus* and *Cupressus.*

46 **(d)**

(i) Regulator - mammals and birds

(ii) Conformer - all plants and 99% animals

(iii) Partial regulators.

48 **(a)**

Inverted pyramid is found in biomass pyramid of aquatic ecosystem. In this, the number of producers is maximum but their mass is minimum, which gradually rises up in the successive trophic levels.

e. g. , Phytoplanktons (minimum mass)
→ zooplanktons → small fishes
→ large fishes (maximum mass).

49 **(c)**

If a predator if overexplaits its prey then prey might become extinct and following it the predator will also become extinct for lack of food

50 **(d)**

Decomposers are saprotrophs, which decompose the organic remains. These are saprophytic fungi and bacteria.

51 **(d)**

Osmotrophs are the organisms that obtain nutrients through the active uptake of soluble materials across the cell membranes. This group includes bacteria and fungi

52 **(c)**

Rain (humidity) is required for higher primary productivity. Desert have the lower primary productivity as the soil is deficient in moisture. Greater nutrients ensure greater primary productivity

53 **(d)**

Detritus is non-living particulars organic material. It typically includes the bodies or fragments of dead organisms as well as faecal material. Detritus is typically colonised by communities of microorganisms, which act to decompose the material. In terrestrial ecosystems, it is encountered as leaf litter and other organic matter intermixed with soil, which is referred to as humus. Detritus of aquatic ecosystems is organic material suspended in water, which is referred to as marine snow

54 **(c)**

Decomposition of organic matter is brought about by microorganisms. These are also called microconsumers or saprobes or saprophytes.

55 **(a)**

Various stages in hydrarch are

Phytoplankton

↓(Blue-green algae, bacteria)

Rooted submerged

↓(*Hydrilla, Utricularia*)

Floating stage

↓(*Nelumbo, Nymphaea, Azolla*)

Reed swamp stage

↓(*Lemna, Wolffia*)

Sedge meadow stage

↓(*Scirpus, Typha*)

Woodland stage

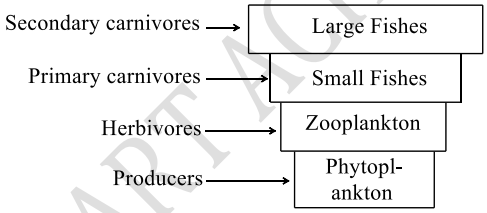
↓(*Juncus, Cyperus*)

Forest stage

56 **(a)**
Food chain consists of producers, consumers and decomposers. In the mentioned question, the producer is grass and the first consumer is insect. Insect is eaten by bird and the bird is eaten by snake. So, the correct food chain would be grass, insects, bird and snake.

57 **(b)**
In the pyramid of number, the number of individual organisms at each trophic level is shown.

58 **(c)**
In pond ecosystem producers are the smallest organisms while, carnivores are large in size. Consequently, there is a gradual increase in biomass of organisms at successive trophic levels from producers onward to top carnivores resulting in inverted pyramid
Thus, the biomass of phytoplanktons will be smaller than that of zooplanktons. The biomass of zooplanktons will be lesser than of primary carnivores (*e.g.,* small fishes). In such a inverted pyramid of biomass, small standing crop of phytoplankton support a large standing crop of zooplankton



59 **(d)**
Ecotone is a zone of transition between two adjacent communities. In ecotone, the density of most of the species is higher than that in neighbouring communities. These species are called **edge species** and this feature of ecotone as principle of edges.

60 **(d)**
An ecosystem may be defined as a structural and functional unit of the biosphere, comprising living organisms and their non-living environment that interact by means of food chains and chemical cycles resulting in energy flow, biotic diversity and material cycling to form a stable, self-supporting system

61 **(b)**
Phytoplankton → Submerged plant stage → Submerged free floating plant stage → Read swamp stage → Marsh-meadow stage → Scrub stage → Forest

63 **(d)**
Phosphorus is a major constituent of biological membranes, nucleic acids and cellular energy transfer systems. It is required for making shells, bones and teeth

64 **(d)**
The first biotic community which develops in a bare area is called pioneer community. It has very little diversity. This stage takes the longest time to change the environment for invasion of the next community

65 **(a)**
Benthos are those animals, which live at the bottom of a lake. They are primary consumers in the depth of the pond.

66 **(b)**
From the given option only b can be correct because pyramid of biomass is upright in that condition only

67 **(c)**
Decomposers are organotrophs which feed on dead bodies of organisms and organic wastes of living organisms.

68 **(b)**
Standing water ecosystem as lake, pond, pools, puddles, ditch, swamp etc are called **lentic**, while running water ecosystem as spring, stream and rivers are called **lotic.**

69 **(a)**
Primary succession on rock starts with lichen of species *Rhizocarpon, Rinodina* and *Lecanora.* They produce some acid, which bring about weathering of rocks. That result into soil formation

71 **(c)**
Gross primary productivity is the rate of production of organic matter during photosynthesis in an ecosystem. GPP is utilized by plants in respiration.

Net primary productivity is the weight of the organic matter stored by the produces in a unit area/volume per unit time.
It is given by NPP = GPP – R
Where, R = Respiration losses
NPP is utilised by heterotrophs

72 **(d)**
Lion is tertiary consumer (top carnivore) in Eltonian pyramid.

73 **(a)**
Most primary productivity of pond is by phytoplankton

74 **(d)**
The carbon cycle occurs through atmosphere ocean and through living and dead organisms. It is estimated that 4×10^{13} kg of carbon is fixed in the biosphere through photosynthesis annually

75 **(c)**
Temperature regulates the activity of an enzyme. So, optimum temperature is required for proper functioning of an enzyme

76 **(a)**
A-Produces; B-Top level consumers

78 **(b)**
The small crustaceans (water fleas, *Cyclops*) are herbivores as they feed phytoplanktons. They are free-floating animals and form the zooplankton. The primary consumers in pond ecosystem are zooplanktons and other primary consumers are mosquito larvae, tadpoles, snails and tortoises

79 **(c)**
Human activities like deforestation and vehicular burning of fossil has caused an increase in the amount of CO_2 in atmosphere

80 **(b)**
In sulphur cycle, the main reservoir is earth crust. In carbon cycle, the main reservoir is atmosphere

81 **(d)**
Ecosystem consists of producers (autotrophs), consumers (herbivores, carnivores) and decomposers.

82 **(c)**
Biotic factors of ecosystem linked together for food and form a chain called food chain. The various steps in food chain are called trophic levels. According to pyramid of energy-the energy flows from one trophic level to next in one direction only.

According to law of thermodynamics, when energy transformed from one step to next step then some energy is liberated in the form of heat.

As the autotrophs (green plants) form the base of food chain, therefore, they have highest amount of energy.

83 **(a)**
The entire sequence of development stage of biotic succession from pioneer to a climax community is known as sere. The succession varians stae when occurs in acid area are called xerarch. The various stages of biotic succession taking place in a water body are collectively termed as hydrosere, while such a succession is known as hydrarch succession

84 **(b)**
An ecosystem is whole biotic community in a given area plus its abiotic environment. Energy flow in ecosystem is unidirectional, *i.e.,* from producers to consumers.

85 **(d)**
Producers → Primary consumers → Secondary consumers → Tertiary consumers
(Algae) (Bugs) (Fish) (Bear)

86 **(d)**
Primary succession on rocks starts with lichen of species *Rhizocarpon, Rinodina* and *Lecanora*. They produce some acids which bring about weathering of rocks. These lichens are then replaced by foliose type of lichens. Due to description and retention of water by them, they from a fine thin soil layer on rock surface and thus there, is a change in the habitat

87 **(c)**
The sequential, gradual and predictable changes in the species composition in an area are called ecological succession

89 **(d)**
Biogeochemical cycle.
In sulphur cycle, the main reservoir is earth crust. In carbon cycle, the main reservoir is atmosphere

90 **(c)**
Nekton are aquatic organisms that can actively swim at will against the water current. They live in shallow and deep ocean waters. Most nekton eat zooplankton, other nekton or thy scavange for waste.

91 **(b)**

Photoautotrophs are the green plants, some protists, such as *Euglena* and certain bacteria, such as green sulphur bacteria. With the help of their chlorophyll, they entrap the light energy of the sun and change it into the chemical energy in the form of simple carbohydrate, glucose which are produced by them from simple inorganic compounds, namely carbon dioxide and water. This process is called photosynthesis

92 **(c)**

The term nutrient cycle or biogeochemical cycle is used for the exchange/circulation of biogenetic nutrients between the living and non-living components of the biosphere. Biogenetic nutrients or biogeochemical nutrients are essential elements required by the organisms for their body building and metabolism. These are provided by earth and return to earth again after their death and decay

93 **(c)**

Ecosystem.

An ecosystem may be defined as a structural and functional unit of the biosphere, comprising living organisms and their non-living environment that interact by means of food chains and chemical cycles resulting in energy flow, biotic diversity and material cycling to form a stable, self-supporting system

94 **(a)**

There is some sort of relationship between the numbers, biomass and energy contents of the producers and consumers of different orders in any ecosystem. These relationships, when represented in diagrammatic ways, are called ecological pyramids

Ecological pyramids are of the types

(i) Pyramid of number

(ii) Pyramid of biomass

(iii) Pyramid of energy

The concept of pyramid was proposed by Charles Elton (1927) so, they are also called as Eltonian pyramids

95 **(b)**

Secondary productivity is the rate of storage of organic matter by consumers per unit area per unit time

96 **(a)**

Nekton and neuston are actively swimming animals which includes, fishes, turtles, whales, seals, etc.

Benthos are large numbers and sessil or relatively inactive animals.

97 **(a)**

The secondary succession is easy and is complete quickly, because the area already has soil and some vegetation. Soil is present in the area, where secondary succession begins

98 **(b)**

Gross primary productivity is utilised by plants in respiration

99 **(c)**

As decomposers are the primary weapons to decompose the dead organic matter so, the extinction of the decomposers will severely destroy the nature as the dead remains in the nature will accumulate and they will not get decomposed.

The dead matter will not get decomposed and as a result the soil will not get the nutrients by the decomposition of dead matter and hence the soil will become infertile

100 **(b)**

A-Biotic, B-Abiotic, C-Producer, D-Consumers, E-Dettitivares

The option b is the correct because from the chart zooplankton only can be primary consumer because they fead an phytoplankton. They can not be secondary or tertiary consumer in food chains

101 **(a)**

A biotic components includes the non-living physico-chemical factors of the environment. These components not only affect the distribution and structure of organisms but also their behavior and inter-relationships. Abiotic factors include inorganic substances, organic compounds, climatic factors and edaphic factors

102 **(c)**

The shape of pyramid of energy is always upright as energy always decreases at each successive level (*i.e.,* from producers to consumers).

103 **(b)**

Organic remains (dead plant parts, animal remains and excretions) are also called detritus. A food chain, which begins with detritus or dead organic matter is called detritus food chain. The energy passes into decomposers and detrivores, then to smaller carnivores, then to larger carnivores and so on.

104 **(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.

105 **(a)**
Ecosystem is an open system. It receive input in the form of solar energy and matter. It results in productivity or synthesis of organic food. Food with its contained energy passes through various components of ecosystem

106 **(b)**
Phosphorus and sulphur.
In sedimentary cycle, the main reservoirs are soil and rocks, *e*. *g*., sulphur cycle, phosphorus cycle, etc.

107 **(d)**
Tropical rain forests (tropical dense forests) occur near the equator where rainfall and temperature are very high.

108 **(b)**
In a lake, there are littoral zone, limnetic zone and profundal zone. In limnetic zone, the producers are mainly phytoplanktoni algae which are diatoms, green algae and blue green algae. In profundal zone, the organisms mainly depend for their food on the littoral and limnetic zone.

109 **(b)**
A-10%, B-Lindeman, C-1942

110 **(b)**
The process of 'humification' can occur naturally in soil or in the production of compost. It leads to accumulation of dark amorphous substance called humus

111 **(b)**
Total energy fixed by an ecosystem is called gross production

112 **(b)**
Detrivores feeds on and breakdown the dead plants and animal matter, returning essential nutrients to the ecosystem. Detritivores includes microorganisms such as bacteria and protists as well as larger organisms such as fungi, insects, worms and isopod crustaceans

113 **(c)**
All the animals that depend for food on plants are called consumers. *Consumers are divided into the following categories*

Primary consumers Animals which feed directly on plants, *i.e.,* herbivores
Secondary consumers Consumers that feed on primary consumers, *i.e.,* carnivores
Tertiary consumers Consumers that feed on secondary consumers. Grazers is one of the category of consumers

115 **(d)**
Nitrogen and carbon cycle.
In sedimentary cycle, the main reservoirs are soil and rocks, *e*. *g*., sulphur cycle, phosphorus cycle, etc.

117 **(a)**
Producers

118 **(b)**
The zone of transition between two different communities presenting a situation of overlapping is known as **ecotone**.

119 **(d)**
The major functions of an ecosystem includes
(i) Productivity (ii) Decomposition
(iii) Energy flow (iv) Nutrient cycling

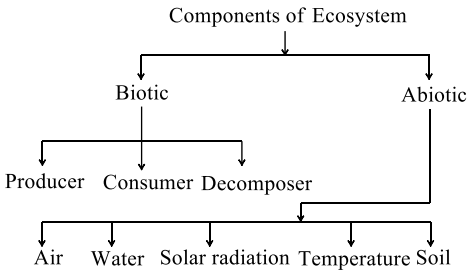
121 **(b)**
Sun.
A much less fraction of energy flows through grazing food chain in ecosystem terrestrial. Energy for the food chain comes from the sun. Food chain adds energy into the ecosystem

122 **(d)**
Free energy is the portion of a system's energy that can perform work when temperature is uniform throughout the system as in a living cell.

Enthalpy is the total energy including usable energy and unusable energy.

123 **(a)**
Xerarch succession is plant succession which takes place in dry area leading to a successional series from xeric to mesic conditions

124 **(c)**
Living organisms.
The components of an ecosystem may be divided into two main types, *i.e.,* **Biotic component** comprising the various kinds of living organisms and **Abiotic component** consisting of environmental factors



125 **(a)**
Prosopis is a tree found in scrub. *Saccharumofficinarum* is grass, which is cultivated. *Shorea robusta* (sal) is tree found in moist tropical forests. *Acacia catechu* is tree found in dry deciduous forests.

126 **(b)**
A-Top carnivore, B-Detritus, C-Frog

127 **(a)**
Some workers differentiate into two more categories of living beings amongst the biotic components of an ecosystem. These are detrivores and parasites. Parasites belong to diverse groups, $e.g.$, bacteria, fungi, protozoans, worms, etc. Every type of living being can be attacked by parasites. Detrivores or scavengers are animals which feed on dead bodies of other organisms, $e.g.$, termites, carrion beetles. They are helpful in quick disposal of the dead bodies

128 **(d)**
Phosphorus.
In sedimentary cycle, the main reservoirs are soil and rocks, $e.g.$, sulphur cycle, phosphorus cycle, etc.

129 **(c)**
Pyramid of energy represents amount of energy traped per unit area and time in different trophic levels of a food chain. It is always upright.

130 **(b)**
The rate of synthesis of energy containing organic matter by any trophic level per unit area in unit time is described its productivity. It is measured as weight ($e.g.$, $g/m^2/yr$) or energy ($e.g.$, $kcal/m^2/yr$). The amount of energy accumulation in green plants as biomass or organic matter per unit area over a time period through the process of photosynthesis is known as primary productivity. Primary productivity is expressed in term of weight (g^{-2}) or energy ($kacl\ m^{-2}$). C_4-plants area more productive that C_3 plants. Sugar cane is most productive crop being efficient in trapping light

131 **(c)**
The number of trophic levels in the food chain is restricted as the transfer of energy follows 10% law. This law states that only 10% of the energy is transferred to next trophic level from the lower trophic level

132 **(a)**
In a terrestrial ecosystem, plant grows by manufacturing food from carbon dioxide of air and water and minerals of soil with the help of chlorophyll and sunlight. Plants, thus acts as the producer on land
In a pond, phytoplankton (rooted and floating plants) synthesise food materials from dissolved nutrients by photosynthesis. They, thus act as the producers. Consumers are not producers. They eat (consume) producers

133 **(d)**
In both hydric and xerharch succession ultimately lead to mesarch conditions. The pioneer species on bars rock is always lichen

134 **(b)**
Phytoplanktons are the producers in ocean's ecosystem.

135 **(c)**
An inverted pyramid of biomass may occasionally be observed in marine communities

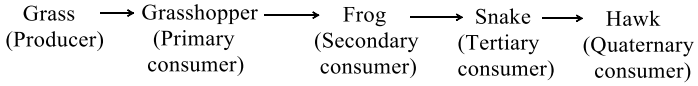
136 **(b)**
Vertical distribution of different species occupying different levels is called stratification. For example, in forest ecosystem, trees occupies the top vertical strata, shrubs occupies the second and herbs, grasses occupies the bottom layer. It is not a functional unit of an ecosystem

137 **(b)**
In a pond ecosystem, fishes occupy the more than one trophic levels.

138 **(d)**
Humus is dark coloured amorphous substance rich in lignin and cellulose

139 **(a)**
Maximum energy is found in first trophic level (T_1) $i.e.$, produces.

140 **(b)**
Secondary consumer



141 **(d)**
The organisms, which attack dead animals are the

present at end of food chain and known as decomposers. Decomposers are heterotrophic organisms, mostly bacteria and fungi, which lives on dead organic matter or detritus. They release different enzymes from their bodies into the dead and decaying plant and animal remains, leading to the release of simple inorganic substances. Thus, they play an important role in the cycling of minerals

142 **(a)**

Pyramid of energy is a graphic representation of the 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 the top. The pyramid of energy is **always upright**.

143 **(d)**

There is some sort of relationship between the number, biomass and energy contents of the producers and consumers of different orders in any ecosystem. These relationships, when represented in diagrammatic ways are called ecological pyramids. The concept of pyramid was proposed by Charles Elton (1927) so, they are also called as Eltonian pyramids

144 **(c)**

The formula of ecological efficiency is

$$= \frac{\text{Energy in biomass production at a trophic level}}{\text{Energy in biomass prodcution at prevense trophic level}} \times 100$$

We know that plant (producers) convent the photo energy into chemical energy and according to Lindman rule of energy transfer only 1% of energy will be transferred from one trophic level to other trophic level

So according to the formula of ecological efficiency primary consumer will have less ecological efficiency then secondary consumers because energy in biomass be production at first tropical level (*i.e.,* producers level) will more while ecological efficiency of secondary consumer will be high then primary consumer because in secondary consumer the energy produced in biomass at previous tropical level will be less then producer level

145 **(c)**

In tree ecosystem, the pyramid of number is inverted because only one tree has many consumers like birds, insects, etc.

While in pond, desert and forest ecosystem, the pyramids of numbers are upright because producers are large in number.

146 **(c)**

Producers → Primary consumers → Secondary consumers

(Grass) (Zebra) (Lion)

147 **(a)**

Ecosystem	Shape of Pyramid
Pyramid of number	
Grassland	Upright
Forest (tree)	Inverted
Aquatic (pond)	Upright
Pyramid of biomass	
Grassland	Upright
Forest	Upright
Aquatic (lake)	Inverted
Pyramid of energy	
All ecosystems	Upright

148 **(a)**

The process by which humus is further degraded by some microbes to release inorganic nutrients is called mineralisation

149 **(a)**

The process by which humus is degraded by some microbes to release inorganic nutrients is called mineralisation

150 **(d)**

Halophytes (*i.e.,* plants growing in saline soils) show the characteristics of xerophytes, *e.g., Sueda, Tamarix, Atriplex*, etc. These characters include succulence, thick cuticle, sunken stomata, high osmotic pressure, presence of anthocyanin, tannins, proline and other organic solutes, well developed root system etc.

151 **(a)**

Secondary succession or 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 forest fires, deforestation, excessive overgrazing, landslides, earthquakes, repeated floods, etc. only 50 to 100 years are required for establishment of a grassland over a

recently denuded area. Formation of forest requires 100 to 200 years.

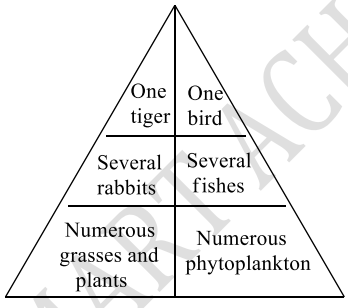
152 **(c)**
Phytoplanktons are found in **littoral zone**, which is shallow water region.

153 **(d)**
A primary consumers or herbivores are animals which feed on plants or plant products, *e*. *g*., grasshoppers and several other insects, rabbit, hare, field mouse, deer, antelope, cow, elephant, zooplankton, tadpoles and some fishes

154 **(d)**
Burning of wood, forest fire, volcanic activity and combustion of organic matter and fossil fuels area are some essential sources for releasing CO_2 in the atmosphere

156 **(d)**
There are certain limitations of ecological pyramids, they are
(i) It do not take into account the same species belonging to two or more trophic levels
(ii) It assumes a simple food chain, whereas in nature it does not exist
(iii) Saprophytes/decomposers are not given any place in ecological pyramids

157 **(d)**
The pyramid of energy is always upright whatever will be the case. It represents the total amount of energy utilised by different level organisms in unit area over a period of time



Pyramid of energy

158 **(b)**
A good example of succession is the hydrarch succession or hydrosere succession, in which, a pond and its community are converted into a land community. In their reed swamp stage, amphibious plants grow where the water body becomes shallow (0.3-1.0 m), *e.g.,Sagittaria*.

Juncus shows sedge-medow stage, *Salix* shows woodland stage, while *Trapa* shows rooted-floating stage.

159 **(a)**
The rate of formation of new organic matter by consumers is called secondary productivity

160 **(c)**
Food web is a network of food chains, interconnected at various trophic levels, so as to form a number of feeding alternatives amongst the different organisms of a biotic community.

161 **(d)**
In successive seral stages, there is not only a change in the species diversity of organisms present but there is also an increase in the number of species. Succession of plants and animals communities occurs side by side

162 **(a)**
Nitrogen cycle.
In gaseous cycles, the main reservoirs of chemical are the atmosphere and ocean, *e*. *g*., carbon cycle, nitrogen cycle, oxygen cycle, etc.

163 **(d)**
(i) Deserts have the lowest primary productivity as the soil is deficient in moisture
(ii) Some plants have more efficiency to trap sunlight (sugar cane), so they accumulate more primary productivity
(iii) Productivity is maximum in the coral reefs because they grow in areas having good light, enough warm water and abundant nutrients

164 **(a)**
Pyramid of energy is a picture of rates of passage of food mass through the food chain. It is **always upright**, as in most of the cases there is always a gradual decrease in the energy content at successive trophy levels.

165 **(d)**
In a food chain a plant is primary producer. Producers are autotrophic organisms, which alone are able to manufacture organic food from inorganic raw materials in the process of photosynthesis

166 **(b)**
The highest primary productivity in terms of per unit area is of estuaries > Swamps and marrhes >Tropical rair forest > Temperate forest whicle in terms of average would net primary.
Production is of opern ocean > Tropical rain forest > Temperate rainforest > Sauanna > Nothern coniferous forest

167 **(c)**
Great barrier reef along the North-eastern Australia is an ecosystem. It is about 2000 km long and up to 150 km from shore.

168 **(a)**
A much less fraction of energy flows through grazing food chain in ecosystem terrestrial. Energy for the food chain comes from the sun. Food chain adds energy into the ecosystem

169 **(a)**
Rain is required for higher primary productivity. Desert have the lowest primary productivity as the soil is deficient in moisture

170 **(c)**
The ultimate source of entire energy used by living things in an ecosystem is sunlight. Solar energy received by an ecosystem depends on the latitude, slope, cloud cover, air pollutants, etc.

171 **(d)**
Climax community is the stable, self perpetuating and final biotic.
Climax community is the stable, self perpetuating and final biotic community that develops at the end of biotic succession and is in perfect harmony with the physical environment. It is also termed as climatic climax community

172 **(b)**
Stratification involves vertical changes, within the community. Stratification in a forest community (especially tropical forests) is most complicated, where as many as five vertical sub-divisions may be recognized, *i.e.,* subterranean sub-division, forest floor, herbaceous vegetation, shrubs and trees.

174 **(c)**
Only 10% of the herbivore productivity is utilised for raising productivity of primary carnivores. The rest is consumed in ingestion, respiration, maintenance of body heat and retain only 10% of energy present in primary carnivores. It is called 10% law which was proposed by Lindeman, 1942

175 **(a)**
Ecological succession is directional because succession proced in a direction and periodical. Primary succession is a biotic succession that occurs on a previously sterile or primarily bare area, *e*. *g*., newly exposed sea floor igneous rocks, sand dunes, new cooled lava sediment, etc.

176 **(c)**
At 40° North and South, the heat gain through insolation approximately equals to the heat loss through terrestrial radiation.

177 **(d)**
Herbivores (plant-eating animals) are depends upon producers (plant) so, rabbits are herbivores

179 **(b)**
Pyramid of number is used to know how many organisms are present at each level of a food chain

180 **(c)**
For food, light and space, the greatest competition is between two closely related species of same niche. Struggle for existence (competition) may be intraspecific (*i.e*., between individuals of the same species), interspecific (*i.e.,* between different species) and extra specific (*i.e*., between individual and its environment).

181 **(d)**
Human activities like deforestation and massive burning of fossil fuel for energy and transport have significantly increased the rate of release of CO_2 into the atmosphere

182 **(b)**
In gaseous cycles, the main reservoirs of chemical are the atmosphere and ocean, *e*. *g*., carbon cycle, nitrogen cycle, oxygen cycle, etc.

183 **(d)**
Producers constitute the first trophic level or base of a food chain. Producers are autotrophic organisms, which alone are able to manufacture organic food from inorganic raw materials in the process of photosynthesis

184 **(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.

185 **(a)**
Productivity of tropical rainforest is highest. The tropical rain forest covering 300,000 km^2 area. They contain more than 50% of total flora and fauna of the world.

186 **(a)**
In a pond ecosystem, **producers** include phytoplankton (*e.g.,* diatoms, *Chlorella*, *Spirogyra, Chlamydomonas*, etc), free floating

macrophytes(*e.g.,Lemna, Azolla*), suspended macrophytes(*e.g., Utricularia, Hydrilla*), submerged plants (*Vallisneria*), floating leaved plants (*e.g., Nelumbo*), emergent plants (*Sagittaria*) etc.

187 **(c)**
Both (a) and (b).
An ecosystem may be defined as a structural and functional unit of the biosphere, comprising living organisms and their non-living environment that interact by means of food chains and chemical cycles resulting in energy flow, biotic diversity and material cycling to form a stable, self-supporting system

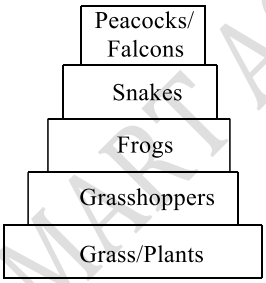
188 **(a)**
Population of two or more species, whose geographical ranges or distribution concide or overlap are known as **sympatric species**.

Allopatric species occupy different vertical zones in the same geographical area.

Parapatric species do not overlap but continuous, *i.e.,* touch each other.

Ring species are characterized by circular or looped geographical distribution.

189 **(b)**
In a grassland ecosystem, a larger number of grass plants or herbs support a fewer number of grasshoppers that support a still smaller number of frogs, the latter still smaller number of snakes and the snakes very few peacocks or falcons



190 **(c)**
Buried or cut forest already has soil humus and some vegetation (underground stems). So in buried or cut forest, succession is easy and is completed

191 **(a)**
Each trophic level has a certain mass of living material at a particular time called the standing crop. The standing crop is measured as the biomass of living organisms (biomass), as the number in a unit area

192 **(b)**
We know that plant only utilisexd 1-2% of total energy incident on earth. In the given dustion 100000 Kcal/m^2/yr salar radiation is incident on earth. So plant producer utilize 1% of 100000 kcal m^2/yr and that 1% is
$= \frac{100000 \times 1}{100} = 1000$ kcal/m^2/yr
And from produces to the next level only 10% will goes, so $\frac{1000 \times 10}{100} = 100$ kcal/m^2/yr will be transferred to primary consumer which is called secondary production

194 **(b)**
By the process of leaching, water-soluble inorganic nutrients go down into the soil horizon and get precipitated as unavailable salts

195 **(a)**
Climate.
Climax community is the stable, self perpetuating and final biotic community that develops at the end of biotic succession and is in perfect harmony with the physical environment. It is also termed as climatic climax community

196 **(a)**
A population consists of organisms of a particular species and has characteristics like natality, mortality, age structure growth dynamics, etc. When several populations share a common habitat and its resources, they interact among themselves and develop into a biotic community. Hence, community is a larger unit than a population.

197 **(d)**
The end result of decomposition is the production of dark brown, smelling, humus rich organic matter and inorganic substance like carbon dioxide, water and nutrients

198 **(a)**
In sedimentary cycle, the main reservoirs are soil and rocks, *e*. *g*., sulphur cycle, phosphorus cycle, etc.

199 **(c)**
A certain mass of living material at each trophic level of an ecosystem at a particular time is called **standing crop**. The standing crop is measured as the mass of living organisms (biomass) or the number in a unit area.

201 **(a)**
Vertical distribution of different species

occupying different levels is called stratification, *e*. *g*., in a forest ecosystem, trees occupy top vertical strata or layer, shrubs the second and herbs and grasses occupy the bottom layers

202 **(b)**
Phytoplankton → Submerged plant stage A → Submerged free floating plant stage B → Read swamp stage C → Marsh-meadow stage → Scrub stage D → Forest plant stage

203 **(d)**
Pioneer community is the Ist biotic community, which develops in barren area. Pioneer community is established over a previously bare area

204 **(a)**
Plant can utilises 1.% (0.01) of total incident radiation green all plant utilises 1-2% of total incident radiation sugar can is the most efficient crop which utilises the 5% of total incident radiation into photosynthetic product

205 **(d)**
2-10%.
Out of the total incident solar radiation, only 50% of it is Photosynthetically Active Radiation (PAR). Plants capture only 2-10% of the PAR and this small amount of energy sustains the entire living world

206 **(d)**
Homeostasis or state of equilibrium or balance of nature is maintained through a number of controls like carrying capacity self regulation and feedback system

207 **(d)**
Trophic levels are the divisions or levels of food chain characterized by specific method of obtaining food (and energy).

208 **(a)**
Sulphur cycle.
In sedimentary cycle, the main reservoirs are soil and rocks, *e*. *g*., sulphur cycle, phosphorus cycle, etc.

209 **(c)**
The successive development of different biotic communities at the same site till a climax community develops there, is called ecological succession (Hutt; 1885). The species that invade a bare area are celled **pioneer species**. In primary succession on rocks (xerarch succession) these are usually lichens which are able to secrete acids (lichenic acid) to dissolve rock, helping in weathering and soil formation. These later pave way to some very small plants like bryophytes (*e.g.,* Mosses) which are able to take hold in the small amount of soil.

Secondary succession or subsere is a biotic succession on a secondarily bare area, *e.g.,* burned forests, area after deforestation. It takes 50-100 years (for grassland) and 100-200 years(for forest). Ferns are generally the first to grow after the forest fire because of their underground rhizomes.

210 **(b)**
An ecosystem, which is created and maintained by human beings, is called artificial or man-made ecosystem. Some examples of man-made ecosystem are aquarium, garden, agriculture, apiary, poultry, piggery etc.

211 **(c)**
PAR – Photosynthetically Active Radiation. The sum is the only source of energy for all ecosystems on earth. Out of the total incident solar radiation, only 50% of it is photosynthetically Active Radiation (PAR) Plantscapture only 2-10% of the PAR and this small amount of energy sustains the entire living world. So, there is unidirectional flow of energy from the sun to producers and then to consumer

212 **(c)**
The sunlight directly regulates the primary productivity because the plants perform photosynthesis with the help of sunlight. The amount of biomass or organic matter produced per unit area over a time period in plants during photosynthesis is called primary production

213 **(c)**
The nutrient reservoir meets the deficit arising due to imbalance in the rate of influx and efflux of nutrient

214 **(b)**
Gause's hypothesis was restated by Hardin (1960) as the competitive exclusion principle which in its simplest form states that "complete competitors cannot coesist". Both having the same needs to survive works as competitors. Most populations are regulated by competition, primarily for food.

215 **(b)**
According to **Odum** (1983), ecosystem has six

components, in which abiotic components almost similar in every ecosystem.

(i) **Abiotic components**

(a) **Inorganic substances**

C, N, S, K, CO_2, H_2O, temperature, humidity, soil light, pressure, etc.

(b) **Organic substances**

Proteins, carbohydrates, lipids, etc.

(ii) **Biotic components**

Producers, macroconsumers, microconsumers.

216 **(c)**
The transfer of energy from producers to top consumers through a series of organisms is called food chain. It is always straight and proceed in a progressive straight line. In a food chain, the maximum population is of producers

217 **(c)**
Producers → Primary consumers → Secondary consumers
(Grain) (Chicken) (Man)

218 **(a)**
Pyramid of energy is never inverted because in each ecosystem producers are green plants, which prepare their own food in the process of photosynthesis and thus, trap maximum solar energy. In herbivores, only 10% of energy of plants transfer and rest 90% is itself used by the plants and some loss as heat. Further, primary carnivores take only 10% of energy from herbivores, i.e., 1% of plants. In this way, energy percentage becomes reduced in next higher trophic levels. This 10% flow of energy from one trophic level to the next is called 10 percent law of Lindemann.

219 **(d)**
Biomes are climatically and geographically defined as similar climatic conditions on the earth, such as communities of plants, animals and soil organisms. A biome has a certain set of characteristics. There are seven kinds of biomes in the world-tundra, taiga, temperate forests, deserts, grassland and ocean.

220 **(a)**
Pyramid of number is a graphic representation of the number of individuals per unit area of various trophic levels stepwise with producers being kept at the base and top carnivores kept at the top. In most cases, the pyramid of number is upright with members of successive higher trophic level being fewer than the previous one. The maximum number of individuals occur at the **producer level**.

221 **(d)**
The exchange pool in the carbon cycle is the atmosphere in the gaseous cycle (carbon cycle) the reservoir is the atmosphere

222 **(c)**
The amount of biomass or organic matter produced per unit area over a time period in plants during photosynthesis is called primary production. It is expressed in the terms of weight (g^{-2}) or energy (kcal m^{-2})

223 **(b)**
The energy level in a trophic level is not determined by considering individuals of a species in that trophic level.

224 **(d)**
Primary consumers are herbivorous animals, which obtain their food from green photosynthetic plants (*i.e.,* producers). Insects and cattle are primary consumers.

225 **(c)**
The amount of living matter in an ecosystem is known as biomass. It is measured both as fresh and dry weight

226 **(c)**
The amount of biomass or organic matter produced per unit area over a time period in plants during photosynthesis is called primary production. Primary productivity depends upon photosynthetic capacity of plants and nutrient availability

227 **(a)**
Producer are also called as tranducer because they are able to change radiant energy into chemical form. Consumers are animals which feed on other organisms or their parts. Consumer ingest their food. Decomposers are saprophytes which feed on dead bodies of organisms. The decomposer organisms secrete digestive enzymes to digest the organic matter externally

228 **(d)**
Only 10% of the herbivore productivity is utilized

for raising productivity of primary carnivores. The rest is consumed in ingestion, respiration, maintenance of body heat and other activities

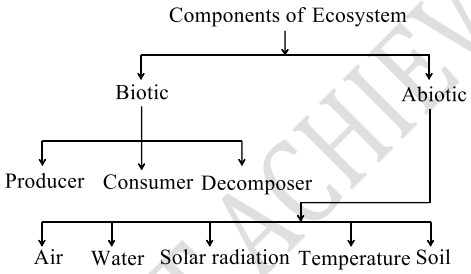
229 **(a)**
A-Amorphous, B-Humus, C-Humification

230 **(d)**
Autogenic succession (auto-self, genic-generate) is the modification and development of new environment made by the community itself such that the community makes its own replacement by new communities. The changed environment is now favourable for new community.

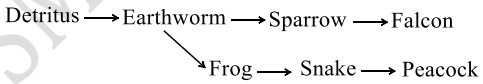
232 **(c)**
The percentage of energy converted into biomass by a higher trophic level over the energy of food resources available at the lower trophic level is called ecological efficiency. It is also called Lindemann's trophic efficiency rule.

$$EE = \frac{\text{Energy converted into biomass at trophic level}}{\text{Energy present in biomass at lower trophic level}} \times 100$$

233 **(d)**
The components of an ecosystem may be divided into two main types, *i.e.,* **Biotic component** comprising the various kinds of living organisms and **Abiotic component** consisting of environmental factors



234 **(a)**
Detritus Food Chain (DFC) begins with detritus or dead organic matter. Detrivores and decomposers feed over it



235 **(b)**
The rate of formation of new organic matter by consumers is called secondary productivity

236 **(a)**
The sequence of communities showing a gradual change in composition called **continuum** (**Curtis**; 1959).

237 **(a)**
Small phytoplanktons → Free floating angiosperms → Rooted hydrophytes → Sedges → Grasses → Trees

238 **(b)**
Zooplanktons are the microscopic animals that feed on the phytoplanktons in an aquatic ecosystem. These are truely herbivorous and form the second trophic level (primary consumers) equivalent to cows in grasslands.

239 **(a)**
Organic remain.
A much larger fraction of energy flows in aquatic ecosystem through the graizing food chain than through the grazing food chain. Energy for the food chain comes from organic remain or detritus

240 **(d)**
The decomposition rate is slow if detritus is rich in cellulose, lignin and chitin

241 **(b)**
Food web (*i.e.,* network of food chains interconnected at various trophic levels) is meant for increasing the stability of an ecosystem by providing alternate sources of food.

242 **(b)**
When a person consumes curd/yoghurt, it would be considered in the top or apex (*i.e.,* 2nd trophic level) of detritus food chain. Yoghurt or curd is a commercial fermented dairy product. It is produced by a starter culture of *Streptococcus thermophiles* and *Lactobacillus* in 1 : 1 ratio at 40 − 60°C and then partial fermentation by yeast. *Streptococcus* produced acid and *Lactobacillus* forms aroma.

243 **(a)**
A-Biotic, B-Abiotic, C-Decomposers, D-Photoautotrophs, E-Chemoautotrophs

244 **(a)**
In a grassland ecosystem, the number of producers is more than the number of top carnivores, whereas in case of a tree, the number of producers is less as compared to consumers

245 **(d)**
Phosphorus is needed for the production of DNA and RNA, cellular membranes, bones and teeth

246 **(d)**
(i) The term 'ecosystem' was coined by Sir AG Tansley (1935) to describe the whole complex of

living organisms living together as a sociological units and their habitats
(ii) The entire biosphere is referred to as global ecosystem, which consists of several local ecosystems of earth. The size of the ecosystem varies from small pond to a large forest or sea
(iii) Vertical distribution of different species occupying different levels is called stratification, *e*. *g*., in a forest ecosystem, trees occupy top vertical layer, shrubs the second and herbs and grasses occupy the bottom layers

247 **(a)**
Producers → Herbivores → Carnivores
(Grass) (Cow) (Human)

248 **(d)**
Biological membrane, nucleic acids and cellular energy transfer systems.
Phytoplanktons → Submerged plant stage A → Submerged free floating plant stage B → Read swamp stage C → Marsh-meadow stage → Scrub stage D → Forest plant stage

249 **(a)**
Net Primary Productivity (NPP) is the weight of organic matter stored by producers in a unit area/volume per unit time. NPP is equal to the rate of organic matter created by photosynthesis minus the rate of respirations and other losses. Stored biomass is transferred from one trophic level to another trophic level.

251 **(d)**
In a grazing food chain carnivores like frog, etc are referred to as secondary consumers, which feed on herbivores (primary consumers). Secondary consumers constitute third trophic level of the food chain.

252 **(a)**
Biomass is the living or organic matter of living organisms, in terms of weight, present at any given time in the environment. In a food chain, it can be depicted by pyramid of biomass, which is upright in terrestrial ecosystem and inverted in aquatic ecosystem.

253 **(b)**
Insectivorous plants are autotrophs as they have chlorophyll. They don't eat insects for food, but use them as a source of N and P and use light to transform them into biomolecules

254 **(b)**
Low temperature and anaerobiosis inhibit decomposition. Decomposition is mainly an aerobic process
In aquatic ecosystem GFC is the major conduit for energy flow. As against this in a terrestrial ecosystem much larger fraction of energy flows through the DFC. Dry weight is more accurate

255 **(b)**
The rate at which organic compounds are formed in a green plants or in a population of green plants per unit time and area is known as the gross primary productivity. It is usually measured as an increase in the stored energy or an increase in the biomass. GPP is utilised by plants in respiration

256 **(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 Cyperaeae and Gramineae.

(vi) **Woodland stage**, e.g., *Lantana, Salix, Populus*, etc.

(vii) **Forest stage**, e.g., Tropical rain forests, mixed forests of *Almus, Acer, Quercu*s (oak), tropical deciduous forests.

257 **(b)**
Food web
Producers

259 **(d)**
Ecological efficiency or trophic level efficiency refers to the percentage of energy converted into biomass by a higher trophic level over the energy of food resources available at the lower trophic level. The formula is as follows :

Ecological efficiency=

$$\frac{\text{Energy in biomass production at trophic level}}{\text{Energy in biomass production at previous trophic level}} \times 100$$

261 **(c)**
The functional aspect of ecosystem is productivity, decomparition, energy flow and nutrient cycling
Productivity Plant synthesis food with input of solar energy
Decomposition It is the process by which complex organic into organic substances
Energy flow It is the process by which energy stored by plant transferred to the other trophic level and at each trophic level energy is disputed into atmosphere in different form and in an ecosystem final trophic level is of decomposer, which degrade the complex organic matter in to simple compound so energy flow maintain the integrity of ecosystem
Nutrient cycling The movement of nutrient element through various component of an ecosystem is called nutrient cycling

262 **(a)**
The transfer of energy from producers to top consumers through a series of organisms is called food chain. One organism holds only one position. The flow of energy can be easily calculated. It is always straight and proceeds in a progressive straight line. Competition is limited to the members of same trophic level

263 **(d)**
Out of the total incident solar radiation, only 50% of it is Photosynthetically Active Radiation (PAR). Plants capture only 2-10% of the PAR and this small amount of energy sustains the entire living world

264 **(d)**
Tectona grandis is a vegetation of tropical moist deciduous forests.

265 **(c)**
Pyramid of energy is the graphic representation of the amount of energy trapped per unit time and area in different trophic levels of a food chain from producers to top carnivores. Pyramid of energy is a true pyramid as it is always upright.

267 **(b)**
The 10% energy transfer law of food chain is best known as **Lindemann's law of trophic efficiency**. It was given by **Lindemann**. It states that the efficiency of energy transfer from one trophic level to the next is about 10%.

269 **(c)**
In **early stages of plant succession**, photosynthesis is more than respiration (P > R) and in **climax stage**, huge respiration of living biomass occurs and (P / R = 1) or, photosynthesis is equal to respiration (P = R). So, net productivity becomes stable, when climax stage is reached in plant succession.

270 **(a)**
Ecotone is the area of transition between two biotic communities or ecosystems. Ecotone is characterized by the presence of species of both the communities.

271 **(b)**
Primary Productivity (PP) is defined as the rate at which radiant energy is converted by the photosynthetic and chemosynthetic autotrophs to organic substances

272 **(a)**
Maximum amount of energy is present in producers (at first trophic level) and goes on decreasing as one moves up the food chain.

273 **(d)**
The amount of living matter present in an ecosystem is known as biomass. It is upright in case of a tree, which supports a large number of birds and inverted in a pond, where a large fish eats upon a large number of phytoplanktons

274 **(c)**
A climax community is stable, self perpetuating and final biotic community that develops at the end of biotic succession and is in perfect harmony with the physical environment. It has maximum diversity and niche specialization.

275 **(d)**
Producers → Herbivores → Carnivores
(Grass) (Rabbit) (Hawk)

277 **(a)**
4×10^{13} kg

278 **(a)**
Succession levels in xerarch (xerosere/lithosere) are :

(i) Lichen stage, *e.g.,* Crustose lichens followed by

foliose lichens.

(ii) Moss stage, *e.g., Tortula, Polytrichum*

(iii) Annual grass stage, *e.g., Cymbopogon*

(iv) Perennial herb and shrub stage, *e.g., Rubus, Capparis, Zizyphus*.

(v) Climax community, *e.g.,* Forests with herbs, shrubs and trees.

280 **(a)**
During weathering of rocks, minute amount of phosphates dissolve in soil solution and are absorbed by plant producer through roots

282 **(a)**
Temperate zone is at $\mathbf{40-60^{\circ}}$ **latitude** with mixed coniferous forests. Annual temperature is $7-17$°C.

Sub-tropical zone is at $\mathbf{20-40^{\circ}}$ **latitude** with sub-tropical deciduous forests. Mean annual temperature is $17-24$°C.

283 **(c)**
Climatic conditions like temperature, moisture and chemical composition affects the rate of decomposition

284 **(d)**
Pyramid of energy.
The pyramid of energy is always upright because energy is always loss as heat at each step. It represents the total amount of energy utilised by different trophic level organisms in unit area over a period of time

285 **(c)**
Decomposers are heterotrophs and saprotrophs, which feeds on dead bodies of organisms and organic wastes of living organisms. These are mainly bacteria and fungi of decay

286 **(c)**
Ecosystem composed of biotic (living) and abiotic (non-living) component. Biotic component includes producers, consumers and detritivores. The producers and detritivores are absolutely essential functional component of the ecosystem.

287 **(c)**
Pioneer community.
Primary succession on rocks starts with lichen of species *Rhizocarpon, Rinodina* and *Lecanora*. They produce some acids which bring about weathering of rocks. These lichens are then replaced by foliose type of lichens. Due to description and retention of water by them, they from a fine thin soil layer on rock surface and thus there, is a change in the habitat

288 **(d)**
Green plants → Insects → Frog → Snakes → Peacock.

From the above food chain, it is clear that the peacock stands at the top.

289 **(a)**
Bacterial and fungal enzymes degrade detritus into simpler inorganic substances. This process is called catabolism

290 **(a)**
A-Deer, B-Frog, C-Foxes, D-Sparrow

291 **(d)**
The pyramid of biomass is inverted in a pond ecosystem, where a large fish eats upon a large number of small phytoplanktons
The pyramid of energy is always upright because the flow energy is unidirectional
Pyramid of number is inverted in a tree ecosystem. In case of a tree, the number of producers is less compared to consumers
Pyramid of biomass is upright in case of a tree which supports a large number of small birds

292 **(c)**
Plants, which are attached to the rocks are called lithophytes

294 **(a)**
The pyramid of energy is always upright because energy is always loss as heat at each step. It represents the total amount of energy utilised by different trophic level organisms in unit area over a period of time

295 **(c)**
Ecological succession is a sequence of series from baren land to the climax. In ecological terms, the developmental stages of a community are known as seral stages and the final stage as the climax community. The change is orderly and sequential. It is a long term process

296 **(c)**
Transfer of food energy from the producers through a series of organisms with repeated eating and being eaten is known as **food chain**. Producers utilize the solar energy and transformed it to chemical form (ATP) during

photosynthesis.

297 **(a)**

Gross primary productivity.

The rate at which organic compounds are formed in a green plants or in a population of green plants per unit time and area is known as the gross primary productivity. It is usually measured as an increase in the stored energy or an increase in the biomass. GPP is utilised by plants in respiration

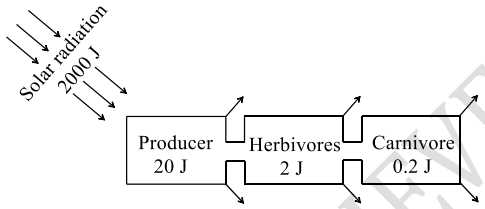
298 **(a)**

An energy link

299 **(a)**

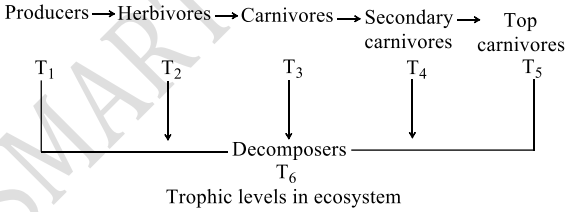
Only about 10% is stored at higher trophic level and the remaining 90% is lost in respiration, decomposition and waste in the form of heat. Suppose 2000 J of solar energy is incident on green vegetation. The latter having about 1% efficiency, trap about 20 J of energy and convent it into chemical energy by photosynthesis

The remaining 1980 J would be lost to the environment. The herbivore that feed on producers get 10% of the energy stored in plants, *i.e.,* 2 J. The remaining 18 J are lost to the environment. Carnivores feeding on herbivores would be able to store only 0.2 J of energy as flow



300 **(c)**

Trophic level is a step or division of food chain which is characterised by the method of obtaining its food. The number of trophic levels is equal to the number of steps in a food chain



Trophic levels in ecosystem

302 **(a)**

Climax community is stable and is in equilibrium with the environment

303 **(c)**

The rate of biomass production per unit area over a time period by plants during photosynthesis is called productivity. It is expressed in $g^{-2}yr^{-1}$ or $(k\ cal\ m^{-2})yr^{-1}$

304 **(a)**

Warm and moist environment favour decomposition. Low temperature and anaerobiosis inhibit decomposition

305 **(d)**

The rate at which organic compounds are formed in a green plants or in a population of green plants per unit time and area is known as the gross primary productivity. It is usually measured as an increase in the stored energy or an increase in the biomass. GPP is utilised by plants in respiration

306 **(d)**

All animals depend on plants directly or indirectly for their food needs. They are hence, called **consumers** and also **heterotrophs**. If they feed on the producer, the plants (belonging to the first trophic level), they are called primary consumers. Obviously the primary consumers will be **herbivores**. Some common herbivores are insects, birds and mammals in terrestrial ecosystem and molluscs in aquatic system. Thus, primary consumers belong to the **second trophic** level.

307 **(d)**

Phytoplanktons are passively floating microscopic animals like, Algae protozoan and cyanobacteria. They drift with water current

308 **(a)**

Nitrogen and carbon cycle.

In gaseous cycles, the main reservoirs of chemical are the atmosphere and ocean, *e*. *g*., carbon cycle, nitrogen cycle, oxygen cycle, etc.

309 **(c)**

Since there is no penetration of effective light to profundal zone, there are no photosynthetic organisms and hence, consumers depend for their food on limnetic and littoral zones. In littoral zone, the main producers are phytoplanktons, algae and other hydrophytes. In limnetic zone, the main producers are diatonms, cyanobacteria dinoflagellates, Euglenidae and Volvocidae.

310 **(b)**

Second stage of hydrosere is occupied by submerged aquatic plants, *e*. *g*., *Hydrilla, Vallisneria*. The third stage has free floating plants, *e*. *g*., *Azolla* (floating aquatic fern). The fourth stage is reed swamp plants like typha, salix includes deciduous trees and shrubs, which constitute the sixth (wood land stage) and climax stages

312 **(c)**

Herbivores are primary consumers, they are

mainly depend on the plants for their food needs. If a single plant species is removed, then they have to find new or other food sources.

313 **(d)**
Food chain starts with photosynthesis. The green plants always occupy first level in any given food chain and are commonly termed as the primary producers

314 **(b)**
Ecosystem is composed of biotic components and abiotic (non-living) components. The biotic components of forest ecosystem are primary consumers (*e.g.*, rabbit, moles, deer, squirrels, grasshoppers, etc), secondary consumers (*e.g.,* carnivorous, birds, snake, lizard, etc) and decomposers (fungi and bacteria). In tropical and subtropical forests, rate of decomposition is more rapid than temperate.

315 **(a)**
Solar energy is the ultimate source of energy in the ecosystem. The pyramid of energy is always upright.

316 **(b)**
Lithosere is a type of xerosere originating on bare rock surfaces. The original substratum is deficient in water and lacks any organic matter having only minerals in disintegrated unweathered state. The pioneer vegetation is, therefore, lichens.

317 **(c)**
Benthic organisms are found in the bottom of sea.

318 **(c)**
The raw materials for decomposition including dead plant and animal remains and their faecal matter are called detritus
Organisms, which breakdown detritus into matter particles called detritivores. These include earthworm, termites, vulture, fly larvae, etc.

319 **(b)**
Biotic community is defined as an assemblage of population that functions as an integrative unit through coevolved metabolic transformation in a prescribed area of physical habitat.

320 **(c)**
Decomposers (saprotrophs) are the organisms that breakdown complex organic matter into inorganic substances and in doing, so they carryout the natural process of decomposition

321 **(a)**
Micro-climate is the climate of immediate surroundings of some phenomena on the surface of the earth, particularly around plants and groups of plants. It helps in the growth of terrestrial pteridophytes in tropical rain forest.

322 **(a)**
Detritus food chain goes from dead organic matter to microbes and then to detritus-feeding organisms and their predators. These organisms are called detrivours, e.g., bacteria, fungi, protozoans, insects, crustaceans, annelids, worms, etc.

323 **(c)**
The ultimate source of energy for biosphere is solar energy, which is captured by producers (green plants) through photosynthesis and stored in organic compounds. The stored energy in the form of food is transferred from producers to herbivores and then to carnivores.

324 **(a)**
A complex of several types of communities (some in complex stage and others in different stages of succession) maintained under more or less similar climatic conditions is known as biome. Various types of biomes are tundra, north coniferous forest, deciduous forest, tropical rain forest chapparal, tropical savanna, grassland and deserts.

325 **(b)**
Decomposers decomposes the dead organic matter to release them back for reuse by the autotrophs, *e*. *g*., bacteria, fungi, protozoans, worms, etc.

326 **(d)**
The pyramid of energy is always upright for any ecosystem.

This situation indicates that, the

(i) Producers have the highest energy conversion efficiency

(ii) Herbivores have a better energy conversion efficiency then carnivores

(iii) Carnivores have better energy conversion

efficiency than top-carnivore.

327 **(a)**
The term ecosystem development was given to ecological succession by **Odum.**

328 **(b)**
Organism are classified into trophic levels according to the source of their nutrients

329 **(c)**
According to 10% low in the following food chain grasses → deer → tiger if tiger have 10 kg biomass then Deer will have 10 time of this and grasses will have 10 times of deer. Biomass because energy produced into biomass at one trophic. level cense only transferred 10% of this

331 **(d)**
Both lion (carnivore) and sparrow (herbivore) are consumers. The Asteroidea occupy several important roles throughout ecology and biology. Sea stars, such as Ochre star (*Pisarterochraceus*) have become widely known as the example of the keystone species concept in ecology. Most species are generalist predators, eating molluscs such as clams, oysters etc.

333 **(b)**
Net primary productivity is the weight of the organic matter stored by the producers in a unit area/volume for unit time. It is given by NPP = GPP – R (Gross Primary Productivity) where, R = Respiration losses. It is utilised by hetertrophs

334 **(d)**
The climate features of tropical deciduous forests are warm summers, cold winters, and well-spaced rainfall amounting to about 75-100 cm per year. In India, these forests possess important trees of genera such as *Terminalia, Tectona* (teak), *Dalbergia*(sisham), *Shorea* (sal) and *Acacia*. These are very important timber trees.

335 **(a)**
Gross primary productivity is the rate of production of organic matter during photosynthesis in an ecosystem

336 **(d)**
According to 10% law 10% of herbivore's chemical energy is transferred to carnivore's chemical energy. According to 10% law

337 **(a)**
Upper layer of soil.
Decomposition is the process of breaking down a substance into its constituent parts.
Decomposition of dead organic matter (plants, animals and waste products of animals) occurs in nature and it is also called decay or putrification. In a terrestrial ecosystem, the upper layer of soil is the main site of decomposition

338 **(c)**
Plant → Deer → Python
Plant → Grasshopper → Frog
Plant → Goat → Lion
Plant → Goat → Python
Plant → Deer → Lion

340 **(d)**
Assimilatory efficiency is the percentage of food energy assimilated for body building to total food ingested. So, the formula

$$AE = \frac{\text{Use of energy in food}}{\text{Energy obtained through food}} \times 100$$

341 **(c)**
The term ecosystem was given by **Tansley** (1935).

342 **(d)**
Decomposers are saprotrophic microorganisms which feed on dead bodies of organisms and organic wastes of living organisms. These are most diverse organisms of an ecosystem.

343 **(b)**
The primary succession occurs in the barren soilless, uninhabited regions such as igneous rock emerged from the sea, lava deposit, sand dune, newly created pond or reservoir

344 **(a)**
Incorrect food chain Grass → Frog → Vulture

345 **(c)**
The term 'niche' was for the first time used by **Grinnel** (1971) to explain micro-habitats. According to him 'niche' is the ultimate distributional unit, within which each species is held by its structural and instinctive limitation. Actually niche is the complete account of how an organism uses its environment. Thus, plant lice (aphids) and leaf is the pair correctly representing the organism and its ecological niche.

346 **(b)**
Pyramid of biomass.
The amount of living matter present in an ecosystem is known as biomass. It is upright in case of tree, which supports a large number of

birds and inverted in a pond where a large fish feeds upon a large number of phytoplanktons

347 **(a)**
The pyramid of numbers deal with the number of primary producers and consumers. It is upright in a grassland and inverted in a tree ecosystem. In a grassland the number of producers is more than the number of top carnivores, whereas in case of a tree, the number of producers is less as compared to consumers

348 **(a)**
Stratification is more common in tropical rainforest. Stratification occurs vertically and determined by height of organisms
For example, in a forest community, stratification takes place when trees of different species grow to different heights

349 **(c)**
Major zones in fresh water body as lake are :

(i) **Littoral zone** is the uppermost zone, which is shallow-water region.

(ii) **Limnetic zone** is an open-water zone to depth, where effective light can penetrate, it is the chief 'producing region' in lakes.

(iii) **Profundal zone** is zone of bottom and deep water area, where effective light cannot penetrate. It is found to be absent in ponds.

(iv) **Benthic zone** is deep oceanic zone, which is cold, dark and devoid of producer organisms. Benthos are either detritus feeders or carnivores.

350 **(b)**
The process of breaking down of detritus into smaller particles is called fragmentation, *e*. *g*., as done by earthworm

351 **(d)**
The major reservoir for phosphorus is in phosphate rocks and fossil bone deposits laid down in the past geological ages. There is no atmospheric phase in the phosphorus cycle
Phosphorus becomes available in the soil for plants use by natural erosion of rocks and by human efforts
Plants takes up phosphorus form the soil. Animals get it from the plants directly or through other smaller animals. Animals excrete phosphorus mainly as phosphates, which the plants can use immediately

352 **(b)**
71% of the carbon is found dissolved in oceans, which is responsible for its regulation in atmosphere

354 **(d)**
Phytoplanktons, diatoms and dinoflagellates are the dominant producers in the world's oceans. Diatoms tend to dominate in Northern waters, while dinoflagellates are quite common in sub-tropical and tropical waters.

355 **(d)**
Temperate needle-shaped (coniferous) torests are the coniferous forests occurring at an altitude of 1700-3000 m. Major trees of this area are various species of *Pinus*. *Cedrus* and *Cupressus*.

356 **(b)**
Three main types of environmental zones are recognized in the ocean basin
(i) **Littoral zone** Sea floor in the region of continental shelf.
(ii) **Benthonic zone** Sea floor along continental slope, aphotic and abyssal zones.
(iii) **Pelagic zone** Water of the ocean.

357 **(a)**
In an ecosystem, biological equilibrium or a balance is found between producers, consumers and decomposers. An ecosystem should always maintain this balance. If primary consumers in an ecosystem are absent, then producers will be increased in number and will create over-crowding. It results in competition and consequently number of producers will decrease to near normal.

358 **(b)**
Heterotrophs.
Net primary productivity is the weight of the organic matter stored by the producers in a unit area/volume for unit time. It is given by NPP = GPP – R (Gross Primary Productivity) where, R = Respiration losses. It is utilised by hetertrophs

359 **(b)**
Lichen → Small bryophytes → Herb → Shrubs → Tress → Forest

360 **(c)**
Another name of nutrient cycle is biogeochemical cycle. The movement of nutrient elements through various components (abiotic and biotic) of an ecosystem is called nutrient cycling or

biogeochemical cycle

361 **(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.

362 **(c)**

Ecotone is the transition zone between two ecosystems. Ecotone is the zone of distribution of organisms across the boundaries of which the individuals of a species becomes progressively fewer, less productive and sometimes smaller.