Chapter 6
Principles of Ecology

Question 1.
Arrange the correct sequence of ecological hierarchy starting from lower to higher level.
(a) Individual organism → Population Landscape → Ecosystem
(b) Landscape → Ecosystem → Biome → Biosphere
(c) community → Ecosystem → Landscape → Biome
(d) Population → organism → Biome → Landscape
Answer:
(a) Individual organism → Population Landscape → Ecosystem

Question 2.
Ecology is the study of an individual species is called
(i) Community ecology
(ii) Autecology
(iii) Species ecology
(iv) Synecology
(a) i only
(b) ii only
(c) i and iv only
(d) ii and iii only
Answer:
(b) ii only

Question 3.
A specific place in an ecosystem, where an organism lives and performs its functions is
(a) habitat
(b) niche
(c) landscape
(d) biome
Answer:
(b) niche

Question 4.
Read the given statements and select the correct option.
(i) Hydrophytes possess aerenchyma to support themselves in water.
(ii) Seeds of Viscum are positively photoblastic as they germinate only in presence of light.
(iii) Hygroscopic water is the only soil water available to roots of plant growing in soil as it is present inside the micropores.
(iv) High temperature reduces use of water and solute absorption by roots.
(a) i, ii, and iii only
(b) ii, iii and iv

(c) ii and iii only
(d) i and ii only
Answer:
(d) i and ii only

Question 5.
Which of the given plant produces cardiac glycosides?
(a) Calotropis
(b) Acacia
(c) Nepenthes
(d) Utricularia
Answer:
(a) Calotropis

Question 6.
Read the given statements and select the correct option.
(i) Loamy soil is best suited for plant growth as it contains a mixture of silt, sand and clay.
(ii) The process of humification is slow in case of organic remains containing a large amount of lignin and cellulose.
(iii) Capillary water is the only water available to plant roots as it is present inside the micropores.
(iv) Leaves of shade plant have more total chlorophyll per reaction centre, low ratio of chi a and chi b are usually thinner leaves.
(a) i, ii and iii only
(b) ii, iii and iv only
(c) i, ii and iv only
(d) ii and iii only
Answer:
(d) ii and iii only

Question 7.
Read the given statements and select the correct option.
Statement A: Cattle do not graze on weeds of Calotropis.
Statement B: Calotropis have thorns and spines, as defense against herbivores.
(a) Both statements A and B are incorrect.
(b) Statement A is correct but statement B is incorrect.
(c) Both statements A and B are correct but statement B is not the correct explanation of statement A.
(d) Both statements A and B are correct and statement B is the correct explanation of statement A.
Answer:
(b) Statement A is correct but statement B is incorrect.

Question 8.
In soil water available for plants is
(a) gravitational water
(b) chemically bound water
(c) capillary water
(d) hygroscopic water
Answer:
(c) capillary water

Question 9.
Read the following statements and fill up the blanks with correct option.

1. Total soil water content in soil is called _____
2. Soil water not available to plants is called _____
3. Soil water available to plants is called _____

	(*i*)	(*ii*)	(*iii*)
(*a*)	Holard	Echard	Chresard
(*b*)	Echard	Holard	Chresard
(*c*)	Chresard	Echard	Holard
(*d*)	Holard	Chresard	Echard

Answer:
(a) Holard, Echard and Cheresard

Question 10.
Column I represent the size of the soil particles components. Which of the following is correct match for the Column I and Column II

Column - I	Column - II
(*I*) 0.2 to 2.00 mm	(*i*) Slit soil
(*II*) Less than 0.002 mm	(*ii*) Clayey soil
(*III*) 0.002 to 0.02 mm	(*iii*) Sandy soil
(*IV*) 0.002 to 0.2 mm	(*iv*) Loamy soil

	I	II	III	IV
(*a*)	*ii*	*iii*	*iv*	*i*
(*b*)	*iv*	*i*	*iii*	*ii*
(*c*)	*iii*	*ii*	*i*	*iv*
(*d*)	None of the above			

Answer:
(c) i, ii, i and iv

Question 11.
The plant of this group are adapted to live partly in water and partly above substratum and free from water
(a) Xerophytes
(b) Mesophytes
(c) Hydrophytes
(d) Halophytes
Answer:
(b) Mesophytes

Question 12.
Identify the A, B, C and D in the given table:

Interaction	Effects on species X	Effects on species Y
Mutualism	A	(+)
B	(+)	(-)
Competition	(-)	C
D	(-)	0

	A	B	C	D
(a)	(+)	Parasitism	(-)	Amensalism
(b)	(-)	Mutalism	(+)	Competition
(c)	(+)	Competition	(0)	Mutalism
(d)	(0)	Amensalism	(+)	Parasitism

Answer:
(a) (+) Parasitism (-) Amensalism

Question 13.
Ophrys an orchid resembling the female of an insect so as to able to get pollinated is due to phenomenon of
(a) Myrmecophily
(b) Ecological equivalents
(c) Mimicry
(d) None of these
Answer:
(c) Mimicry

Question 14.
A free living nitrogen fixing cyanobacterium which can also form symbiotic association with the water fem Azolla
(a) Nostoc
(b) Anabaena
(c) Chlorella
(d) Rhizobium

Answer:
(b) Anabaena

Question 15.
Pedogenesis refers to
(a) Fossils
(b) Water
(c) Population
(d) Soil
Answer:
(d) Soil

Question 16.
Mycorrhiza promotes plant growth by
(a) Serving as a plant growth regulators
(b) Absorbing inorganic ions from soil
(c) Helping the plant in utilizing atmospheric nitrogen
(d) Protecting the plant from infection
Answer:
(d) Protecting the plant from infection

Question 17.
Which of the following plant has a non-succulent xerophytic and thick leathery leaves with waxy coating?
(a) Bryophyllum
(b) Ruscus
(c) Nerium
(d) Calotropis
Answer:
(d) Calotropis

Question 18.
In a fresh water environment like pond, rooted autotrophs are
(a) Nymphaea and typha
(b) Ceratophyllum and Utricularia
(c) Wolffia and pistia
(d) Azolla and lemna
Answer:
(a) Nymphaea and typha

Question 19.
Match the following and choose the correct combination from the options given below:

Column I (Interaction)	Column II (Examples)
(*I*) Mutualism	(*i*) Trichoderma and Penicillium
(*II*) Commensalism	(*ii*) Balanophora, Orobanche
(*III*) Parasitism	(*iii*) Orchids and Ferns
(*IV*) Predation	(*iv*) Lichen and Mycorrhiza
(*V*) Amensalism	(*v*) Nepenthes and Diaonaea

	I	II	III	IV	V
(*a*)	*i*	*ii*	*iii*	*iv*	*v*
(*b*)	*ii*	*iii*	*iv*	*v*	*i*
(*c*)	*iii*	*iv*	*v*	*i*	*ii*
(*d*)	*iv*	*iii*	*ii*	*v*	*i*

Answer:
(d) iv, iii, ii, v and i

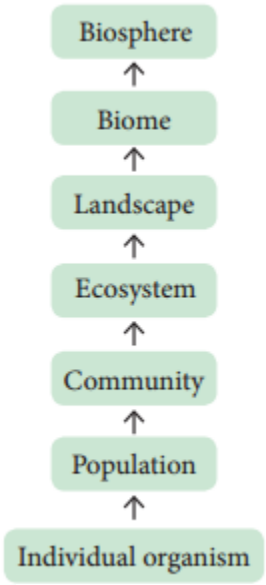
Question 20.
Strong, sharp spines that get attached to animal's feet are found in the fruits of
(a) Argemone
(b) Ecballium
(c) Heraitier
(d) Crossandra
Answer:
(a) Argemone

Question 21.
Sticky glands of Boerhaavia and Cleome support
(a) Anemochory
(b) Zoochory
(c) Autochory
(d) Hydrochory
Answer:
(b) Zoochory

Question 22.
Define ecology.
Answer:

- "The study of living organisms, both plants, and animals, in their natural habitats or homes" – Reiter (1885)
- "Ecology is the study of the reciprocal relationship between living organisms and their environment". – Earnest Haeckel (1889)

Question 23.
What is the ecological hierarchy?
Name the levels of ecological hierarchy.
Answer:
The interaction of organisms with their environment results in the establishment of a grouping of organisms which is called ecological hierarchy.



Question 24.
What are ecological equivalents? Give one example.
Answer:
Taxonomically different species occupying similar habitats (Niches) in different geographical regions are called Ecological equivalents.

Examples:
Certain species of epiphytic orchids of Western Chats of India differ from the epiphytic orchids of South America. But they are epiphytes.

Question 25.
Distinguish habitat and niche.
Answer:
Habitat:

1. A specific physical space occupied by an organism (species).
2. Same habitat may be shared by many organisms (species).
3. Habitat specificity is exhibited by organism.

Niche:

1. a functional space occupied by an organism in the same eco-system
2. A single niche is occupied by a single species
3. Organisms may change their niche with time and season

Question 26.
Why are some organisms called eurythermal and some others as stenohaline?
Answer:
Eurythermal:
Organisms which can tolerate a wide range of temperature fluctuations are called Eurythermal.
Eg : Zostera (a marine angiosperm) and Artemisia tridentata.

Stenohaline:
Organisms which can withstand only a small range of salinity are called stenohaline.
Eg : Plants of estuaries.

Question 27.
'Green algae are not likely to be found in the deepest strata of the ocean'. Give at least one reason.
Answer:
As the name indicates, green algae possess photosynthetic pigments which use light as an energy source for survival and they are not found in the deepest sea since there is a lack of light.

Question 28
What is Phytoremediation?
Answer:
Some plants can also be used to remove cadmium from the contaminated soil, this is known as phytoremediation.
Example: Rice and Eichhornia (water hyacinth) tolerate cadmium by binding it to their proteins.

Question 29.
What is the Albedo effect and write their effects?
Answer:
Gases let out to atmosphere causes climatic change. Emission of dust and aerosols from industries, automobiles, forest fire, and DMS (dimethyl sulphur) play an important role in disturbing the temperature level of any region. Aerosols with small particles is reflecting the solar radiation entering the atmosphere. This is known as Albedo effect.

Question 30.
The organic horizon is generally absent from agricultural soils because tilling, e.g., plowing, buries organic matter. Why is an organic horizon generally absent in desert soils?
Answer:

- Organic horizon consist of fallen leaves twigs, flowers and fruits, dead plants, decomposers, animals and their excreta
- Usually it is absent in agricultural and desert land, because
- Desert soil is driest soil. It consist of mostly sandy particle (90-95%). Its water holding capacity is very low.
- It does not have any plants, animals and decomposers to enrich the soil with organic horizon.
- Desert soil is not enough to support a large diverse plant and animal community because of low organic matter and lack of water holding capacity organic horizon generally absent.

Question 31.
Soil formation can be initiated by biological organisms. Explain how?
Answer:
Soil formation is initiated by the biological weathering process. Biological weathering takes place when organisms like bacteria, fungi, lichens and plants help in the breakdown of rocks through the production of acids and certain chemical substances.

Question 32.
Sandy soil is not suitable for cultivation. Explain why?
Answer:

- Sandy soil loses water at a high rate leading to a low level of water retention that is unsuitable for plant growth.
- Sandy soils are less with humus, minerals bacteria, fungi nematodes, insects, earthworm which is helpful for plants growth.
- Soil productivity and soil fertility of sandy soil will be very low.
- The pH value of the soil solution determines the availability of plant nutrients. The pH value of the sandy soil will be very less.

Question 33.
Describe the mutual relationship between the fig and wasp and comment on the phenomenon that operates in this relationship.
Answer:
Wasps present in the figs is an example of mutualism where both the interacting species are benefitted from the obligate association. Wasps acts as a pollinating agents for figs intum larvae of wasps are nourished and protected by fruits of figs.

Question 34.
Lichen is considered as a good example of obligate mutualism. Explain.
Answer:
Lichen is a mutual association of an alga and a fungus, where the algal partner nourishes and provides shelter to fungi, intum fungi confers protection from bacterial infections and also maintains moisture for algal growth.

Question 35.
What is mutualism? Mention any two example where the organisms involved are commercially exploited in modern agriculture.
Answer:

1. Mutualism is an interaction between two species of organisms in which both are benefitted from the obligate
2. association. Nitrogen fixing cyanobacteria associated with Azolla (a fern) and Rhizobium found in the root nodules of leguminous plant are used in the field of agriculture to increase the soil fertility.

Question 36.
List any two adaptive features evolved in parasites enabling them to live successfully on their host?
Answer:
Holoparasites:
The organisms which are dependent upon the host plants for their entire nutrition are called Holoparasites. They are also called total parasites.

Examples:

- Cuscuta is a total stem parasite of the host plant Acacia, Duranta, and many other plants. Cuscuta even gets flower inducing hormone from its host plant.
- Balanophora, Orobanche, and rafflesia are the total root parasites found on higher plants.

Hemiparasites:
The organisms which derive only water and minerals from their host plant while synthesizing their own food by photosynthesis are called Hemiparasites. They are also called partial parasites.
Examples:
Viscum and Loranthus are partial stem parasites.

Question 37.
Mention any two significant roles predation plays in nature.
Answer:
Predation maintains the stability of the food chain in an ecosystem. The population of the insects and small animals is in control due to predation or else it may lead to overgrazing and browsing thereby altering the vegetation.

Question 38.
How does an orchid Ophrys ensure its pollination by bees?
Answer:

- Mimicry is the phenomenon in which a living organism modifies its form, appearance structure (or) behaviour and looks like another living organism as a self defence and increases the chance of its survival.
- Floral mimicry is usually inviting pollinators.

Example:
The plant, Ophrvs an orchid, the flower looks like a female insect to attract the male insect to get pollinated bv the male insect and it is otherwise called 'floral mimicry1.

Question 39.
Water is very essential for life. Write any three features for plants which enable them to survive in a water scarce environment.
Answer:

1. Presence of a highly developed root system to absorb water.
2. Stems and leaves are covered with waxing coating or dense hairs to avoid transpirational loss.
3. Modified leaves generally leathery and shiny to reflect light and heat.

Question 40.
Why do submerged plants receive weak illumination than exposed floating plants in a lake?
Answer:
Submerged plants like Vallisneria receive dim illumination because the majority of the light are reflected back by the water surface whereas, the floating hydrophytes receive and absorb maximum light as they are on the water surface.

Question 41.
What is vivipary? Name a plant group which exhibits vivipary.
Answer:
Viviparity is the phenomenon, where the seeds germinate and then starts developing to some extent before they detach from the parent plant body. In-plant, it is noticed in Halophytes like Rhizophora.

Question 42.
What is thermal stratification? Mention their types.
Answer:
Thermal Stratification:
It is usually found in aquatic habitats. The change in the temperature profile with increasing depth in a water body is called thermal stratification. There are three kinds of thermal stratification.

1. Epilimnion – The upper layer of warmer water.
2. Metalimnion – The middle layer with a zone of a gradual decrease in temperature.
3. Hypolimnion- The bottom layer of colder water.

Question 43.
How is rhytidome act as the structural defence by plants against fire?
Answer:
Rhytidome is the structural defense by plants against fire. The outer bark of trees which extends to the last formed periderm is called Rhytidome. It is composed of multiple layers of suberized periderm, cortical and phloem tissues. It protects the stem against fire, water loss, invasion of insects and prevents infections by microorganisms.

Question 44.
What is myrmecophily?
Answer:

- Sometimes, ants take their shelter on some trees such as Mango, Litchi, Jamun, Acacia etc.
- These ants act as bodyguards of the plants against any disturbing agent and the plants in turn provide food and shelter to these ants.
- These ants act as bodyguards of the plants against any disturbing agent and the plants, in turn, provide food and shelter to these ants.

Question 45.
What is a seed ball?
Answer:
Seed ball is an ancient Japanese technique of encasing seeds in a mixture of clay and soil humus (also in cow dung) and scattering them on to the suitable ground, not planting trees manually. This method is suitable for barren and degraded lands for tree regeneration and vegetation before the monsoon period where the suitable dispersal agents become rare.

Question 46.
How is anemochory differ from zoochory?
Answer:
Anemochory:

1. Anemochory refers to the seed dispersal by wind.
2. Anemochory seeds are very minute and may have wings or feathery appendages for dispersal.
3. E.g: Orchids

Zoochory:

1. Zoochory refers to the seed dispersal by animals.
2. Zoochory seeds and fruits are very fleshy and succulent and sticky they may have hooks to adhere to the body of animals.
3. E.g: Mango

Question 47.

What is co-evolution?
Answer:

- The interaction between organisms, when continues for generations, involves reciprocal changes in genetic and morphological characters of both organisms.
- This type of evolution is called co-evolution. It is a kind of co-adaptation and mutual change among interactive species.

Example:
Corolla length and probosci's length of butterflies and moths (Habenaria and Moth).

Question 48.
Explain Raunkiaer classification in the world's vegetation based on the temperature.
Answer:
Raunkiaer classified the world's vegetation into the following four types. They are megatherms, mesotherms, microtherms and hekistotherms.

Question 49.
List out the effects of fire on plants.
Answer:
Effects of fire:

1. Fire has a direct lethal effect on plants.
2. Burning scars are the suitable places for the entry of parasitic fungi and insects.
3. It brings out the alteration of light, rainfall, nutrient cycle, fertility of soil, pH, soil flora and fauna.
4. Some fungi which grow in soil of burnt areas are called pyrophilous.
5. Example: Pyronema confluence.

Question 50.
What is the soil profile? Explain the characters of different soil horizons.
Answer:
Soil is commonly stratified into horizons at different depths. These layers differ in their physical, chemical, and biological properties. This succession of super-imposed horizons is

called a soil profile.

Horizon	Description
O–Horizon (Organic horizon) Humus	It consists of fresh or partially decomposed organic matter. O1 – Freshly fallen leaves, twigs, flowers and fruits. O2 – Dead plants, animals and their excreta decomposed by micro-organisms. Usually absent in agricultural and deserts.
A–Horizon (Leached horizon) Topsoil - Often rich in humus and minerals.	It consists of top soil with humus, living creatures and in-organic minerals. A1 – Dark and rich in organic matter because of mixture of organic and mineral matters. A2 – Light coloured layer with large sized mineral particles.
B-Horizon (Accumulation horizon) (Subsoil - Poor in humus, rich in minerals)	It consists of iron, aluminium and silica rich clay organic compounds.
C - Horizon (Partially weathered horizon) Weathered rock Fragments - Little or no plant or animal life.	It consists of parent materials of soil, composed of little amount of organic matters without life forms.
R – Horizon (Parent material) Bedrock	It is a parent bed rock upon which underground water is found.

Question 51.
Give an account of various types of parasitism with examples.
Answer:
Parasitism:
It is an interaction between two different species in which the smaller partner (parasite) obtains food from the larger partner (host or plant). So the parasitic species is benefited while the host species is harmed. Based on the host-parasite relationship, parasitism is classified into two types they are holoparasite and hemiparasite.

Holoparasites: The organisms which are dependent upon the host plants for their entire nutrition are called Holoparasites. They are also called total parasites.

Examples:

- Cuscuta is a total stem parasite of the host plant Acacia, Duranta and many other plants. Cuscuta even gets flower inducing hormone from its host plant.
- Balanophora, orobanche and Refflesia are the total root parasites found on higher plants.

Hemiparasites:
The organisms which derive only water and minerals from their host plant while synthesizing their own food by photosynthesis are called Hemiparasites. They are also called partial parasites.

Examples:

- Viscum and Loranthus are partial stem parasites.
- Santalum (Sandal Wood) is a partial root parasite.
- The parasitic plants produce the haustorial roots inside the host plant to absorb nutrients from the vascular tissues of host plants.

Question 52.
Explain different types of hydrophytes with examples.
Answer:
Hydrophytes
The plants which are living in water or wet places are called hydrophytes. According to their relation to water and air, they are subdivided into the following categories:

1. Free-floating hydrophytes
2. Rooted-floating hydrophytes
3. Submerged floating hydrophytes
4. Rooted- submerged hydrophytes
5. Amphibious hydrophytes.

1. Free-floating hydrophytes: These plants float freely on the surface of the water. They remain in contact with water and air, but not with soil. Examples: Eichhornia, Pistia, and Wolffia (smallest flowering plant).

2. Rooted floating hydrophytes: In these plants, the roots are fixed in the mud, but their leaves and flowers are floating on the surface of the water. These plants are in contact with soil, water and air. Examples: Nelumbo, Nymphaea, Potomogeton and Marsilea.

3. Submerged floating hydrophytes: These plants are completely submerged in water and not in contact with soil and air. Examples: Ceratophyllum and Utricularia.

4. Rooted-submerged hydrophytes: These plants are completely submerged in water and rooted in soil and not in contact with air. Examples: Hydrilla, Vallisneria and Isoetes.

5. Amphibious hydrophytes (Rooted emergent hydrophytes): These plants are adapted to both aquatic and terrestrial modes of life. They grow in shallow water. Examples: Ranunculus, Typha and Sagittaria.

Question 53.
Enumerate the anatomical adaptations of xerophytes.
Answer:

1. Presence of multilayered epidermis with heavy cuticle to prevent water loss due to transpiration.
2. The hypodermis is well developed with sclerenchymatous tissues.
3. Sunken shaped stomata are present only in the lower epidermis with hairs in the sunken pits.
4. Scotoactive type of stomata found in succulent plants.
5. Vascular bundles are well developed with several layered bundle sheath.
6. The mesophyll is well-differentiated into palisade and spongy parenchyma.
7. In succulents, the stem possesses a water storage region.

Question 54.
List out any five morphological adaptations of halophytes.
Answer:
Morphological adaptations

1. The temperate halophytes are herbaceous but the tropical halophytes are mostly bushy.
2. In addition to the normal roots, many stilt roots are developed.
3. A special type of negatively geotropic roots called pneumatophores with pneumatophores to get sufficient aeration are also present. They are called breathing roots.
   Example: Avicennia.
4. Presence of thick cuticle on the aerial parts of the plant body.
5. Leaves are thick, entire, succulent and glossy. Some species are aphyllous (without leaves).

Question 55.
What are the advantages of seed dispersal?
Answer:
Advantages of seed dispersal:

- Seeds escape from mortality near the parent plants due to predation by animals or getting diseases and also avoiding competition.
- Dispersal also gives a chance to occupy favourable sites for growth.
- It is an important process in the movement of plant genes, particularly this is the only method available for self-fertilized flowers and maternally transmitted genes in outcrossing plants.
- Seed dispersal by animals helps in the conservation of many species even in human-altered ecosystems.

- Understanding of fruits and seed dispersal acts as a key for proper functioning and establishment of many ecosystems from deserts to evergreen forests and also for the maintenance of biodiversity conservation and restoration of ecosystems.

Question 56.
Describe dispersal of fruit and seeds by animals.
Answer:
Birds and mammals, including human beings, play an efficient and important role in the dispersal of fruit and seeds. They have the following devices.

1. Hooked fruit: The surface of the fruit or seeds have hooks (Xanthium), barbs (Andropogon), spines (Aristida) by means of which they adhere to the body of animals or clothes of human beings and get dispersed.
2. Sticky fruits and seeds:
    - Some fruits have sticky glandular hairs by which they adhere to the fur of grazing animals. Example: Boerhaavia and Cleome.
    - Some fruits have viscid layer which adhere to the beak of the bird which eat them and when they rub them on to the branch of the tree, they disperse and germinate.
      Example: Cordia and Alangium.
3. Fleshy fruits: Some fleshy fruits with conspicuous colours are dispersed by human beings to distant places after consumption.