Organisms and Population

EXERCISE [PAGE 307]

Exercise | Q 1.1 | Page 307

Multiple choice question

Which factor of an ecosystem includes plants, animals, and microorganisms?

1. **Biotic factor**
2. Abiotic factor
3. Direct factor
4. Indirect factor

Solution: Biotic factor

Exercise | Q 1.2 | Page 307

Multiple choice question

An assemblage of individuals of different species living in the same habitat and having functional interactions is _____.

1. **Biotic community**
2. Ecological niche
3. Population
4. Ecosystem

Solution: An assemblage of individuals of different species living in the same habitat and having functional interactions is a **Biotic community.**

Exercise | Q 1.3 | Page 307

Multiple choice question

Association between sea anemone and Hermit crab in gastropod shell is that of _____.

1. Mutualism
2. **Commensalism**
3. Parasitism
4. Amensalism

Solution: Association between the sea anemone and Hermit crab in gastropod shell is that of **Commensalism.**

Exercise | Q 1.4 | Page 307

Multiple choice question

Select the statement which explains the best parasitism.

1. One species is benefited.
2. Both the species are benefited.
3. One species is benefited, other is not affected.
4. **One species is benefited, other is harmed.**

Solution: One species is benefited, other is harmed.

Exercise | Q 1.5 | Page 307

Multiple choice question

Growth of bacteria in a newlly innoculated agar plate shows _____.

1. **exponential growth**
2. logistic growth
3. Verhulst-Pearl logistic growth
4. zero growth

Solution: Growth of bacteria in a newly innoculated agar plate shows **exponential growth.**

Exercise | Q 2.1 | Page 307

Very short answer question

Define the following term

Commensalism

Solution: Commensalism:

Commensalism is the interaction in which one species gets benefited and the other is neither harmed nor benefited.

Exercise | Q 2.1 | Page 307

Very short answer question

Define the following term

Parasitism

Solution: Parasitism:

Parasitism is the interaction in which only one species (parasite) is benefited and the interaction is detrimental to other species (host).

Exercise | Q 2.1 | Page 307

Very short answer question

Define the following term

Camouflage

Solution:

Camouflage:

Camouflage is the cryptic coloration or patterns adopted by prey species to blend with the surroundings or background so as to escape their predators.

Exercise | Q 2.2 | Page 307

Very short answer question

Give one example for Interspecific competition

Solution:

Interspecific competition:

E.g. Competition between leopards and lion, resident fish competing with migratory birds Flamingos for common food i.e. zooplankton

Exercise | Q 2.2 | Page 307

Very short answer question

Give one example for Mutualism

Solution:

Mutualism:

E.g. Lichens represent an intimate, mutualistic relationship between a fungus and photosynthetic algae or cyanobacteria.

Exercise | Q 2.3 | Page 307

Very short answer question

Name the type of association: Clownfish and sea anemone

Solution:

Clown fish and sea anemone: Commensalism

Exercise | Q 2.3 | Page 307

Very short answer question

Name the type of association: Crow feeding the hatchling of Koel

Solution:

Crow feeding the hatchling of Koel: Brood parasitism

Exercise | Q 2.3 | Page 307

Very short answer question

Name the type of association: Humming birds and host flowering plants

Solution:

Humming birds and host flowering plants: Mutualism

Exercise | Q 2.4 | Page 307

Very short answer question

What is the ecological process behind the biological control method of managing with pest insects?

Solution:

The ecological process behind the biological control method of managing with pest insects is Predation. Predators regulate the population of prey in a habitat, thus helping in the management of pest insects.

Exercise | Q 3.1 | Page 307

Short answer question

How is the dormancy of seeds different from hibernation in animals?

Solution:

i. Seed dormancy is the inability of viable seeds to germinate even under suitable environmental conditions, whereas hibernation in animals is a state of reduced activities to escape cold winter conditions.

ii. During seed dormancy, growth and development of an embryo are arrested temporarily, whereas in hibernation animals enter a state of inactivity by slowing their metabolism.

Exercise | Q 3.2 | Page 307

Short answer question

If a marine fish is placed in a freshwater aquarium, will it be able to survive? Give reason.

Solution:

i. If a marine fish is placed in a freshwater aquarium, fish would not be able to survive because marine fishes are adapted to high salt concentrations of the marine environment.

ii. Marine fishes have more osmotic concentration (more salt concentration) than marine water which prevents marine water to enter into the body.

iii. When marine fish is placed in a freshwater aquarium, water enters into the body of marine fish due to osmosis, as freshwater creates a hypotonic environment outside the fish's body.

iv. Entry of water into the body causes its body to swell leading to the death of the marine fish.

Exercise | Q 3.3 | Page 307

Short answer question

Name important defense mechanisms in plants against herbivores.

Solution:

Defense mechanisms in plants against herbivores can be morphological like thorns (in Acacia, Cactus) or chemicals like poisonous cardiac glycosides (produced by Calotropis), secondary metabolites (for e.g.nicotine, caffeine, quinine, strychnine, opium, etc.)

Exercise | Q 3.4 | Page 307

Short answer question

An orchid plant is growing on the branch of the mango tree. How do you describe this interaction between the orchid and the mango tree?

Solution1:

An orchid growing on the branch of a mango tree is an epiphyte. Epiphytes are plants growing on other plants which however, do not derive nutrition from them. Therefore, the relationship between a mango tree and an orchid is an example of commensalisms,

where one species gets benefited while the other remains unaffected. In the above interaction, the orchid is benefited as it gets support while the mango tree remains unaffected.

Solution2:

i. An orchid plant is growing on the branch of a mango tree represents Commensalism.

ii. In this interaction, one species gets benefited and the other is neither harmed nor benefited.

iii. Orchid is an epiphytic plant. While growing on mango tree it gets support but does not derive any nutrition from the mango tree.

iv. Thus, the orchid plant is benefited, while the mango tree is neither benefited nor harmed.

Exercise | Q 3.5 | Page 307

Short answer question

Distinguish between the following: Hibernation and Aestivation

Solution:

	Hibernation	Aestivation
i.	It is also called as winter sleep.	It is also called as summer sleep.
ii.	It is a state of reduced activities in some organisms to escape cold winter conditions.	It is a state of reduced activities in some organisms to escape desiccation due to heat in summer.
iii.	Animals rest in warm places.	Animals rest in cool, shady, and moist places.
iv.	It is shown by bears inhabiting cold regions.	It is shown by some fishes and snails.

Exercise | Q 3.5 | Page 307

Short answer question

Distinguish between the following: Ectotherms and Endotherms

Solution:

	Ectotherms	Endotherms

i.	These are cold-blooded animals.	These are warm-blooded animals.
ii.	Ectotherms do not possess the ability to generate sufficient heat to keep them warm, thus their body temperature varies with surroundings	Endotherms do possess the ability to generate heat and keep them warm, thus they can maintain constant body temperature.
iii.	They are also known as poikilothermic.	They are also known as homeothermic.
iv.	They are affected by changes in environmental temperature	They remain unaffected by changes in environmental temperature.
	E.g. Most of the fishes, amphibians, reptiles	E.g. Birds, mammals

Exercise | Q 3.5 | Page 307

Short answer question

Distinguish between the following: Parasitism and Mutualism

Solution:

	Parasitism	**Mutualism**
i.	In parasitism, only one species (parasite) is benefited and the interaction is detrimental to other species (host).	In mutualism, both species are benefited.
ii.	The parasite needs a host, but the host does not need the parasite.	Both species need the presence of each other.
E.g.	Cuscuta, a parasitic plant commonly found growing on hedge plants.	Lichen represents the mutualistic relationship between a fungus and photosynthetic algae or cyanobacteria.

Exercise | Q 3.6 | Page 307

Short answer question

Write a short note on Adaptations of desert animals

Solution:

Adaptations of animals for desert habitats:

1. Desert animal-like Kangaroo rat inhabiting the Arizona deserts has the potential to concentrate its urine to conserve water. This animal never drinks water in its life.

2. Snakes and desert lizards bask in the sun early in the morning and burrow themselves in the sand in the afternoons to escape the heat of the day, to prevent water loss.

3. Camels can store fat in the hump which can be metabolised for energy. A camel can survive for many days without water. Long eyelashes, ears lined with hair, and slit-like nostrils help to keep out sand.

Exercise | Q 3.6 | Page 307

Short answer question

Write a short note on Adaptations of plants to water scarcity

Solution:

Adaptations of plants for desert habitats:

1. Many desert plants have a thick cuticle on their leaf surfaces and have their stomata in deep pits to minimize loss of water through transpiration.

2. They show a special photosynthetic pathway (CAM - Crassulacean Acid Metabolism) that enables their stomata to remain closed during the daytime.

3. Some desert plants like Opuntia have their leaves reduced (modified) to spines and the photosynthetic function is taken over by the flattened stems.

Exercise | Q 3.6 | Page 307

Short answer question

Write a short note on Behavioural adaptations in animals

Solution:

Behavioural adaptations in animals.

a. To cope up with extreme variations in their environment, some organisms respond through behaviourally (like migration, hibernation, and aestivation).

b. For e.g. Desert lizards manage to keep their body temperature fairly constant by behavioural adaptations.

c. They bask in the sun and absorb heat when their body temperature drops below the comfort zone. But when the ambient temperature starts increasing, they move into the shade.

d. Some species burrow into the sand to hide and escape from the heat.

Exercise | Q 3.7 | Page 307

Short answer question

Define Population and Community.

Solution:

i. Population: Organisms of the same kind inhabiting a geographical area constitute the population.

OR

Individuals live in groups in a well-defined geographical area, share or compete for similar resources, potentially interbreed and thus form a population.

OR

The population is defined as a group of individuals of a species occupying a definite geographic area at a given time.

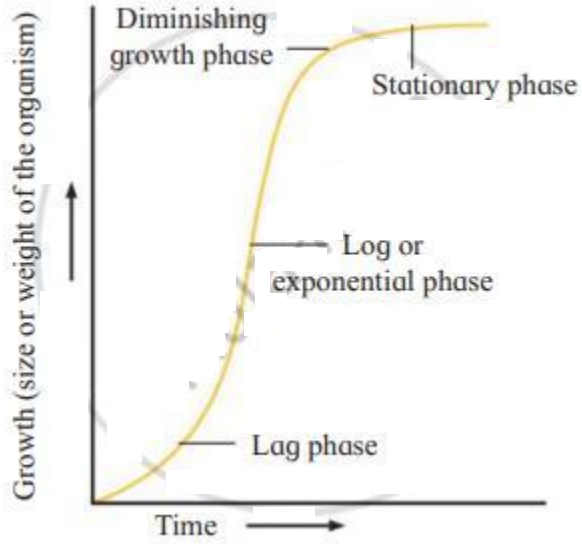
ii. Community: Several populations of different species in a particular area constitute a community that interacts with one another in several ways.

Exercise | Q 4.1 | Page 307

Long answer question

With the help of a suitable diagram describe the logistic population growth curve.

Solution:



Logistic growth curve of population

i. Resources like food and space are not always unlimited. They may be plenty in the beginning; but as the population density increases, competition for those resources starts, resulting in a slowdown in the rate at which the original population was growing. This results in a logistic or sigmoid growth curve.

ii. Competition between individuals for limited resources will weed out the ‘weaker’ ones. Only the ‘fittest’ individuals will survive and reproduce.

iii. A given habitat has enough resources to support a maximum possible number, beyond which no further growth is possible. This limit can be called nature’s carrying capacity (K) for that species in that habitat.

iv. A population growing in a habitat with limited resources shows initially a lag phase, followed by phases of acceleration and deceleration and finally an asymptote when the population density reaches the carrying capacity.

v. A plot of population density (N) in relation to time (t) results in a sigmoid curve. This type of population growth is called VerhulstPearl Logistic Growth.

vi. Since resources for the growth of most animal populations, are finite and become limiting sooner or later, the logistic growth model is considered a more realistic one.

Exercise | Q 4.2 | Page 307

Long answer question

Enlist and explain the important characteristics of a population.

Solution:

i.

The important characteristics of a population are population size, population density, natality, mortality, sex ratio, immigration, emigration, age pyramids, expanding population, population growth forms, and biotic potential.

ii.

Some important characteristics of the population are:

a. Population density: Population density tells us the number of individuals presents per unit space, in a given time.

OR

The density of a population is the total number of individuals in that population present per unit area at a specific time.

b. Natality: Natality is the birth rate of a population.

c. Mortality: Mortality is the death rate of a population.

d. Age distribution and Age pyramids:

1. A population consists of individuals of different ages. The entire population is divided into three age groups – pre-reproductive (0-14 years), reproductive (age 15-44 years), post-reproductive (45-85+years)The relative proportion of individuals of various age groups in the population is referred to as the age structure of the population.

2. If the age distribution (percent individuals of a given age or age group) is plotted for the population, the resulting structure is called as age pyramid.

e. Sex Ratio:

Sex ratio is the ratio of the number of individuals of one sex to that of the other sex.