

## EXERCISE QUESTIONS

### CHAPTER-13 ORGANISMS AND POPULATIONS

#### **1. How is diapause different from hibernation?**

**Ans** -Diapause is a stage of growth that is put on hold to deal with unfavourable circumstances. Many insect and zooplankton species go into diapause to survive unfavourable weather conditions while they are developing. Animals hide themselves inside their homes throughout the winter months to avoid the cold during hibernation, also known as winter slumber. They reduce their metabolism and go into a condition of inactivity to get away from the winter. Bats, squirrels, and other rodents all show the hibernation phenomena..

#### **2. If a marine fish is placed in a fresh water aquarium, will the fish be able to survive? Why or why not?**

**Ans** - Because marine water fish are adapted to thrive in salt water environments, they cannot survive in fresh water. The process of osmoregulation in them will be impacted if they are moved to freshwater. Freshwater will enter a fish's body because to its internal high salt state, causing it to enlarge and eventually burst.

#### **3. Most living organisms cannot survive at temperature above 450C. How are some microbes able to live in habitats with temperatures exceeding 1000C?**

**Ans** -Ancient microorganisms known as archaebacteria (Thermophiles) are discovered at hydrothermal vents in the deep oceans and hot springs. They can endure temperatures well above 100°C because their bodies have evolved to withstand such climatic conditions. Specialized thermo-

resistant enzymes are present in these species, which perform metabolic tasks that are not damaged by such high temperatures.

**4. List the attributes that populations possess but not individuals.**

**Ans** - A population possesses characteristics that a single creature does not. A population's birth and death rates are different from an individual's birth and death rates. Every population has its own distribution pattern, diversity in size, natality, mortality, dispersal, biotic capacity, growth forms, and sex ratio. These qualities are not all possessed by anyone. A population also has a gene pool that its members share.

**5. If a population growing exponentially double in size in 3 years, what is the intrinsic rate of increase (r) of the population?**

**Ans** - A population possesses characteristics that a single creature does not. A population's birth and death rates are different from an individual's birth and death rates. Every population has its own distribution pattern, diversity in size, natality, mortality, dispersal, biotic capacity, growth forms, and sex ratio. These qualities are not all possessed by anyone. A population also has a gene pool that its members share.

**6. Name important defence mechanisms in plants against herbivory.**

**Ans** - A number of plants have developed distinct morphological and pharmacological defences against herbivory. To prevent herbivores from eating them, cactus leaves (Opuntia) are morphologically changed to have sharp spines (thorns). Acacia trees have sharp thorns and leaves to fend off herbivores. Some plants have sharp or spiky edges on their leaf margins that deter herbivores from feeding on them. Chemical defence strategies The deadly cardiac glycosides found in Calotropis weeds are present in all

parts of the plant and can be fatal to herbivores who consume them. Plants make chemical chemicals for self-defense, including nicotine, caffeine, quinine, and opium.

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

**Ans** - One species benefits while the other is unaffected by the connection between the orchid and mango tree, which is an example of commensalism. An epiphyte is a plant that grows on a mango tree limb, such as an orchid. Therefore, epiphytes are plants that grow on other plants but do not rely on them for nutrition. The orchid in the example is regarded as an epiphyte since it receives assistance while the mango tree is unaffected.

**8. What is the ecological principle behind the biological control method of managing with pest insects?**

**Ans** - Predation serves as the foundation for many biological control strategies. Predation is an interspecies biological relationship in which the predator consumes the prey. As a result, predators control the population of prey in an environment, aiding in the control of pest insects.

**9. Distinguish between the following:**

**(a) Hibernation and Aestivation**

**(b) Ectotherms and Endotherms**

**Ans** - The differences between hibernation and aestivation are as follows :

Hibernation	Aestivation
A state of reduction in activity in some organisms to escape winters	A state of reduction in activity in some organisms to escape extreme summers
E.g. Bears and squirrels	E.g. Fishes and snails

	<b>Ectotherms</b>		<b>Endotherms</b>
1.	Ectotherms are cold blooded animals. Their temperature varies with their surroundings.	1.	Endotherms are warm blooded animals. They maintain a constant body temperature.
2.	Fishes, amphibians, and reptiles are ectothermal animals.	2.	Birds and mammals are endothermal animals.

**10. Write a short note on**

**(a) Adaptations of desert plants and animals**

**(b) Adaptations of plants to water scarcity**

**(c) Behavioural adaptations in animals**

**(d) Importance of light to plants**

**(e) Effect of temperature or water scarcity and the adaptations of animals.**

**Ans – (a)** Desert plants are highly adapted to survive the extreme conditions of the desert, such as the lack of water and the intense heat. The desert plants' adaptations include

1. Plants have a complex root system that allows them to get subsurface water.
2. To lessen transpiration, they have thick cuticles and depressed stomata on the surface of their leaves.
3. Opuntia's leaves are totally changed into spines, and its green stalks perform photosynthesis
4. To generate food, a unique pathway called the C4 pathway has been discovered. It makes it possible for the stomata to stay closed throughout the day in order to minimise water loss through transpiration.

**(b) Plants' responses to a lack of water**

Desert plants have developed strong defences against the dry conditions and intense heat. Plants can get subsurface water thanks to their large root systems. To lessen transpiration, they have thick cuticles and depressed stomata on the surface of their leaves. Opuntia has changed its leaves into spines, and its green stalks carry out photosynthesis. Desert plants have unique food-synthesis pathways known as CAM (C4 pathway). It helps them to keep their stomata closed throughout the day in order to lessen transpirational water loss.

**(c) Behavioural adaptations in animals**

Various environmental factors have an impact on different creatures. Organisms undergo adaptations like migration, hibernation, aestivation, etc. to deal with various environmental factors. Behavioral adaptations are changes an organism makes to its behaviour. Animals that are ectothermic

and some endotherms, for instance, show behavioural adaptations. Animals with cold blood, such as fish, amphibians, reptiles, etc., are ectotherms. Their body temperature varies depending on their environment. For instance, the desert lizard enjoys a morning sunbath when the temperature is still relatively low. But when the temperature rises, the lizard digs a hole in the sand to hide from the sweltering sun. Other desert creatures use similar digging techniques.

(d) Importance of light to plants

The most important source of energy for plants is sunlight. Since photosynthesis depends on light for success, plants are autotrophic creatures. Additionally, light is crucial for producing the photoperiodic reactions that occur in plants. To meet their photoperiodic needs for flowering, plants adjust to variations in light intensity throughout the seasons. For the vertical spread of plants in aquatic settings, light is especially crucial.

(e) Effect of temperature or water scarcity and the adaptations of animals.

Effects of temperature change or water scarcity on animal adaptations:  
The primary ecological component is thought to be temperature. The distribution of both plants and animals on Earth is impacted by the differences in average temperature that occur from one location to another. The term "stenothermal animals" refers to those that cannot endure a wide range of temperatures. Euthermal animals are those that can endure a wide variety of temperatures. To fit their ecological environments, certain creatures also go through adaptation processes. For instance, animals living in colder climates have shorter limbs and ears to avoid heat loss from their bodies. Animals like polar bears, for example, have enormous layers of fat

**11. List the various abiotic environmental factors.**

**Ans** -All non- living components of an ecosystem form abiotic components. It includes factors such as temperature, water, light, and soil.

**12. Give an example for:**

**(a) An endothermic animal**

**(b) An ectothermic animal**

**(c) An organism of benthic zone**

**Ans –**

(a) Endothermic animals include mammals like bears, cows, rats, rabbits, and birds like crows, sparrows, pigeons, cranes, etc.

(B) Ectothermic animal: Ectothermic creatures include fish like sharks, amphibians like frogs, and reptiles like tortoises, snakes, and lizards.

(C) It is the ecological region at the lowest level of a water body. Organisms living here are called as benthos. Light does not reach to this zone. In this zone sessile organisms such as sea anemones, sponges, hydrozoans and Decomposing bacteria are found.

**13. Define population and community.**

**Ans** -A population is a group of people belonging to the same species who are present in the same geographic location at the same time and carry out similar functions. For instance, the population of humans is made up of all the people who are present at a certain location and time. A community is described as a collection of people from various species that reside in a particular geographic location. These individuals can be alike or different, but they are unable to procreate with those of other species.

**14. Define the following terms and give one example for each:**

**(a) Commensalism**

**(b) Parasitism**

**(c) Camouflage**

**(d) Mutualism**

**(e) Interspecific competition**

**Ans** –(a) It is a interaction between two organism, in which one species is benefited and the other is neither harmed nor benefited under normal conditions.

Examples of Commensalism

Clown fish living among tentacles of sea anemone: The anemone protects the clownfish and provides a safe place to sleep and breed.

(b) The interaction known as parasitism occurs when one species (the parasite) depends on another species (the host) for food and shelter. This is an example of a bad interaction because the parasite profits while the host suffers.

(c) The prey species have developed this type of tactic to elude their predators. The cryptic colouring of organisms helps them blend in with their surroundings and fend off predators. Many frog and bug species blend in with their surroundings to avoid predators.

(d) This kind of interaction between two creatures is beneficial to both interacting species. Symbiosis is another name for it.

(e) Examples of Mutualism I Mycorrhiza in the roots of higher plants: in this relationship, the root offers food and shelter to the fungus, while the fungus aids in the intake of minerals, water, and also offers protection against pathogenic fungi.

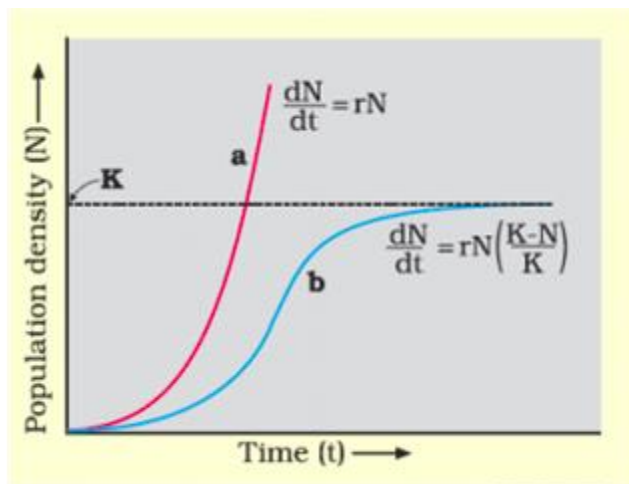


**15. With the help of suitable diagram describe the logistic population growth curve.**

**Ans** - Curve of the logistic population growth

A population expands in accordance with criteria such as food availability, the existence of predators and parasites, the presence of various biotic and abiotic elements that have an impact on a population, and other circumstances in a specific ecosystem. The exponential growth model and the logistic growth model are the two basic categories of models. When there is competition among population members for food and space, that is a sign of expansion. The strongest creature in this situation survives, reproduces, and population expansion is observed. A lag phase is first seen in this sort of growth, which is then followed by phases of acceleration and deceleration.

A diagrammatic representation of Population growth curves is given below. The curve a represents exponential growth and curve b represents logistic growth



The equation of the logistic growth curve is as follows:

$$dN/dt = rN (K - N/K)$$

Where N = Population density at time t

R = Intrinsic rate of natural increase

K = Carrying capacity

**16. Select the statement which explains best parasitism.**

**(a) One organism is benefited.**

**(b) Both the organisms are benefited.**

**(c) One organism is benefited, other is not affected.**

**(d) One organism is benefited, other is affected.**

**Ans -** (d) One organism gains, another suffers.

A type of interaction between two species known as parasitism

whose food is sourced from the other's? (host). Shelter is also a factor in parasitism.

in addition to food that a parasite has gotten. Parasites can be ectoparasites or endoparasites. Endoparasites are parasites that dwell below the surface of their host.reside inside the host's body.

**17. List any three important characteristics of a population and explain**

**Ans -** A population is a collection of people belonging to the same species who are present in the same location at the same time and carry out common functions. For instance, the population of humans is made up of

all the people who are present at a certain location and time. A population's three most crucial traits are: Birth rate (Natality): This term refers to the proportion of live births to total population in a certain location. It is stated as the number of people added to the population as a percentage of the population as a whole. The ratio of deaths to population is known as the death rate (mortality). It is described as the departure of individuals from the members of the population.