Question 1:

How is diapause different from hibernation?

Answer

Diapause is a stage of suspended development to cope with unfavourable conditions. Many species of Zooplankton and insects exhibit diapause to tide over adverse climatic conditions during their development.

Hibernation or winter sleep is a resting stage where in animals escape winters (cold) by hiding themselves in their shelters. They escape the winter season by entering a state of inactivity by slowing their metabolism. The phenomenon of hibernation is exhibited by bats, squirrels, and other rodents.

Question 2:

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

Answer

If a marine fish is placed in a fresh water aquarium, then its chances of survival will diminish. This is because their bodies are adapted to high salt concentrations of the marine environment. In fresh water conditions, they are unable to regulate the water entering their body (through osmosis). Water enters their body due to the hypotonic environment outside. This results in the swelling up of the body, eventually leading to the death of the marine fish.

Question 3:

Define phenotypic adaptation. Give one example.

Answer

Phenotypic adaptation involves changes in the body of an organism in response to genetic mutation or certain environmental changes. These responsive adjustments occur in an organism in order to cope with environmental conditions present in their natural habitats. For example, desert plants have thick cuticles and sunken stomata on the surface of their leaves to prevent transpiration. Similarly, elephants have long ears that act as thermoregulators.

Question 4:

Most living organisms cannot survive at temperature above 45°C°. How are some microbes able to live in habitats with temperatures exceeding 100°C?

Answer

Archaebacteria (Thermophiles) are ancient forms of bacteria found in hot water springs and deep sea hydrothermal vents. They are able to survive in high temperatures (which far exceed 100°C) because their bodies have adapted to such environmental conditions. These organisms contain specialized thermo-resistant enzymes, which carry out metabolic functions that do not get destroyed at such high temperatures.

Question 5:

List the attributes that populations but not individuals possess.

Answer

A population can be defined as a group of individuals of the same species residing in a particular geographical area at a particular time and functioning as a unit. For example, all human beings living at a particular place at a particular time constitute the population of humans.

The main attributes or characteristics of a population residing in a given area are:-

(a) Birth rate (Natality): It is the ratio of live births in an area to the population of an area. It is expressed as the number of individuals added to the population with respect to the members of the population.

(b) Death rate (Mortality): It is the ratio of deaths in an area to the population of an area. It is expressed as the loss of individuals with respect to the members of the population.

(c) Sex ratio: It is the number of males or females per thousand individuals.

(d) Age Distribution: It is the percentage of individuals of different ages in a given population. At any given time, the population is composed of individuals that are present in various age groups. The age distribution pattern is commonly represented through age pyramids.

(e) Population density: It is defined as the number of individuals of a population present per unit area at a given time.

Question 6:

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

Answer

A population grows exponentially if sufficient amounts of food resources are available to the individual. Its exponential growth can be calculated by the following integral form of the exponential growth equation:

$N_t = N_o e^{rt}$

Where,

N_t= Population density after time t

N_O= Population density at time zero

r = Intrinsic rate of natural increase

e = Base of natural logarithms (2.71828)

From the above equation, we can calculate the intrinsic rate of increase (r) of a population.

Now, as per the question,

Present population density = x

Then,

Population density after two years = $2x$

t = 3 years

Substituting these values in the formula, we get:

$\Rightarrow 2x = x\, e^{3r}$

$\Rightarrow 2 = e^{3r}$

Applying log on both sides:

$\Rightarrow \log 2 = 3r \log e$

$$\Rightarrow \frac{\log 2}{3\log e} = r$$
$$\Rightarrow \frac{\log 2}{3\times 0.434} = r$$
$$\Rightarrow \frac{0.301}{3\times 0.434} = r$$
$$\Rightarrow \frac{0.301}{1.302} = r$$
$$\Rightarrow 0.2311 = r$$

Hence, the intrinsic rate of increase for the above illustrated population is 0.2311.

Question 7:

Name important defence mechanisms in plants against herbivory.

Answer

Several plants have evolved various mechanisms both morphological and chemical to protect themselves against herbivory.

(1) Morphological defence mechanisms:

(a) Cactus leaves (*Opuntia*) are modified into sharp spines (thorns) to deter herbivores from feeding on them.

(b) Sharp thorns along with leaves are present in *Acacia* to deter herbivores.

(c) In some plants, the margins of their leaves are spiny or have sharp edges that prevent herbivores from feeding on them.

(2) Chemical defence mechanisms:

(a) All parts of *Calotropis* weeds contain toxic cardiac glycosides, which can prove to be fatal if ingested by herbivores.

(b) Chemical substances such as nicotine, caffeine, quinine, and opium are produced in plants as a part of self-defense.

Question 8:

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

Answer

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.

Question 9:

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

Answer

The basis of various biological control methods is on the concept of predation. Predation is a biological interaction between the predator and the prey, whereby the predator feeds on the prey. Hence, the predators regulate the population of preys in a habitat, thereby helping in the management of pest insects.

Question 10:

Distinguish between the following:

(a) Hibernation and Aestivation

(b) Ectotherms and Endotherms

Answer

(a) Hibernation and Aestivation

	Hibernation		**Aestivation**
1.	Hibernation is a state of reduced activity in some organisms to escape cold winter conditions.	**1.**	Aestivation is a state of reduced activity in some organisms to escape desiccation due to heat in summers.
2.	Bears and squirrels inhabiting cold regions are examples of animals that hibernate during winters.	**2.**	Fishes and snails are examples of organisms aestivating during summers.

(b) Ectotherms and Endotherms

	Ectotherms		Endotherms
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.

Question 11:

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.

Answer

(a) Adaptations of desert plants and animals:

(i) Adaptations of desert plants:

Plants found in deserts are well adapted to cope with harsh desert conditions such as water scarcity and scorching heat. Plants have an extensive root system to tap underground water. They bear thick cuticles and sunken stomata on the surface of their leaves to reduce transpiration. In *Opuntia,* the leaves are entirely modified into spines and photosynthesis is carried out by green stems. Desert plants have special pathways to synthesize food, called CAM (C_4 pathway). It enables the stomata to remain closed during the day to reduce the loss of water through transpiration.

(ii) Adaptations of desert animals:

Animals found in deserts such as desert kangaroo rats, lizards, snakes, etc. are well adapted to their habitat. The kangaroo rat found in the deserts of Arizona never drinks water in its life. It has the ability to concentrate its urine to conserve water. Desert lizards and snakes bask in the sun during early morning and burrow themselves in the sand during afternoons to escape the heat of the day. These adaptations occur in desert animals to prevent the loss of water.

(b) Adaptations of plants to water scarcity

Plants found in deserts are well adapted to cope with water scarcity and scorching heat of the desert. Plants have an extensive root system to tap underground water. They bear thick cuticles and sunken stomata on the surface of their leaves to reduce transpiration. In *Opuntia,* the leaves are modified into spines and the process of photosynthesis is carried out by green stems. Desert plants have special pathways to synthesize food, called CAM (C_4 pathway). It enables their stomata to remain closed during the day to reduce water loss by transpiration.

(c) Behavioural adaptations in animals

Certain organisms are affected by temperature variations. These organisms undergo adaptations such as hibernation, aestivation, migration, etc. to escape environmental stress to suit their natural habitat. These adaptations in the behaviour of an organism are called behavioural adaptations. For example, ectothermal animals and certain endotherms exhibit behavioral adaptations. Ectotherms are cold blooded animals such as fish, amphibians, reptiles, etc. Their temperature varies with their surroundings. For example, the desert lizard basks in the sun during early hours when the temperature is quite low. However, as the temperature begins to rise, the lizard burrows itself inside the sand to escape the scorching sun. Similar burrowing strategies are exhibited by other desert animals. Certain endotherms (warm-blooded animals) such as birds and mammals escape cold and hot weather conditions by hibernating during winters and aestivating during summers. They hide themselves in shelters such as caves, burrows, etc. to protect against temperature variations.

(d) Importance of light to plants

Sunlight acts as the ultimate source of energy for plants. Plants are autotrophic organisms, which need light for carrying out the process of photosynthesis. Light also plays an important role in generating photoperiodic responses occurring in plants. Plants respond to changes in intensity of light during various seasons to meet their photoperiodic requirements for flowering. Light also plays an important role in aquatic habitats for vertical distribution of plants in the sea.

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

Temperature is the most important ecological factor. Average temperature on the Earth varies from one place to another. These variations in temperature affect the distribution of animals on the Earth. Animals that can tolerate a wide range of temperature are

called eurythermals. Those which can tolerate a narrow range of temperature are called stenothermal animals. Animals also undergo adaptations to suit their natural habitats. For example, animals found in colder areas have shorter ears and limbs that prevent the loss of heat from their body. Also, animals found in Polar regions have thick layers of fat below their skin and thick coats of fur to prevent the loss of heat.

Some organisms exhibit various behavioural changes to suit their natural habitat. These adaptations present in the behaviour of an organism to escape environmental stresses are called behavioural adaptations. For example, desert lizards are ectotherms. This means that they do not have a temperature regulatory mechanism to escape temperature variations. These lizards bask in the sun during early hours when the temperature is quite low. As the temperature begins to increase, the lizard burrows itself inside the sand to escape the scorching sun. Similar burrowing strategy is seen in other desert animals.

Water scarcity is another factor that forces animals to undergo certain adaptations to suit their natural habitat. Animals found in deserts such as desert kangaroo rats, lizards, snakes, etc. are well adapted to stay in their habitat. The kangaroo rat found in the deserts of Arizona never drinks water in its life. It has the ability to concentrate its urine to conserve water. Desert lizards and snakes bask in the sun during early morning and burrow in the sand as the temperature rises to escape the heat of the day. Such adaptations can be seen to prevent the loss of water.

Question 12:

Define decomposition and describe the processes and products of decomposition.

Answer

Decomposition is the process that involves the breakdown of complex organic matter or biomass from the body of dead plants and animals with the help of decomposers into inorganic raw materials such as carbon dioxide, water, and other nutrients. The various processes involved in decomposition are as follows:

(1) Fragmentation: It is the first step in the process of decomposition. It involves the breakdown of detritus into smaller pieces by the action of detritivores such as earthworms.

(2) Leaching: It is a process where the water soluble nutrients go down into the soil layers and get locked as unavailable salts.

(3) Catabolism: It is a process in which bacteria and fungi degrade detritus through various enzymes into smaller pieces.

(4) Humification: The next step is humification which leads to the formation of a dark-coloured colloidal substance called humus, which acts as reservoir of nutrients for plants.

(5) Mineralization: The humus is further degraded by the action of microbes, which finally leads to the release of inorganic nutrients into the soil. This process of releasing inorganic nutrients from the humus is known as mineralization.

Decomposition produces a dark coloured, nutrient-rich substance called humus. Humus finally degrades and releases inorganic raw materials such as CO_2, water, and other nutrient in the soil.

Question 13:

Give an example for:

(a) An endothermic animal

(b) An ectothermic animal

(c) An organism of benthic zone

Answer

(a) Endothermic animal: Birds such as crows, sparrows, pigeons, cranes, etc. and mammals such as bears, cows, rats, rabbits, etc. are endothermic animals.

(b) Ectothermic animal: Fishes such as sharks, amphibians such as frogs, and reptiles such as tortoise, snakes, and lizards are ectothermic animals.

(c) Organism of benthic zone: Decomposing bacteria is an example of an organism found in the benthic zone of a water body.

Question 14:

Define population and community.

Answer

Population:

A population can be defined as a group of individuals of the same species residing in a particular geographical area at a particular time and functioning as a unit. For example, all human beings living at a particular place at a particular time constitute the population of humans.

Community:

A community is defined as a group of individuals of different species, living within a certain geographical area. Such individuals can be similar or dissimilar, but cannot reproduce with the members of other species.

Question 15:

Define the following terms and give one example for each:

(a) Commensalism

(b) Parasitism

(c) Camouflage

(d) Mutualism

(e) Interspecific competition

Answer

(a) Commensalism:Commensalism is an interaction between two species in which one species gets benefited while the other remains unaffected. An orchid growing on the branches of a mango tree and barnacles attached to the body of whales are examples of commensalisms.

(b) Parasitism: It is an interaction between two species in which one species (usually smaller) gets positively affected, while the other species (usually larger) is negatively affected. An example of this is liver fluke. Liver fluke is a parasite that lives inside the liver of the host body and derives nutrition from it. Hence, the parasite is benefited as it derives nutrition from the host, while the host is negatively affected as the parasite reduces the host fitness, making its body weak.

(c) Camouflage:It is a strategy adapted by prey species to escape their predators. Organisms are cryptically coloured so that they can easily mingle in their surroundings and escape their predators. Many species of frogs and insects camouflage in their surroundings and escape their predators.

(d) Mutualism: It is an interaction between two species in which both species involved are benefited. For example, lichens show a mutual symbiotic relationship between fungi and blue green algae, where both are equally benefited from each other.

(e) Interspecific competition: It is an interaction between individuals of different species where both species get negatively affected. For example, the competition between flamingoes and resident fishes in South American lakes for common food resources i.e., zooplankton.

Question 16:

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

Answer

The logistic population growth curve is commonly observed in yeast cells that are grown under laboratory conditions. It includes five phases: the lag phase, positive acceleration phase, exponential phase, negative acceleration phase, and stationary phase.

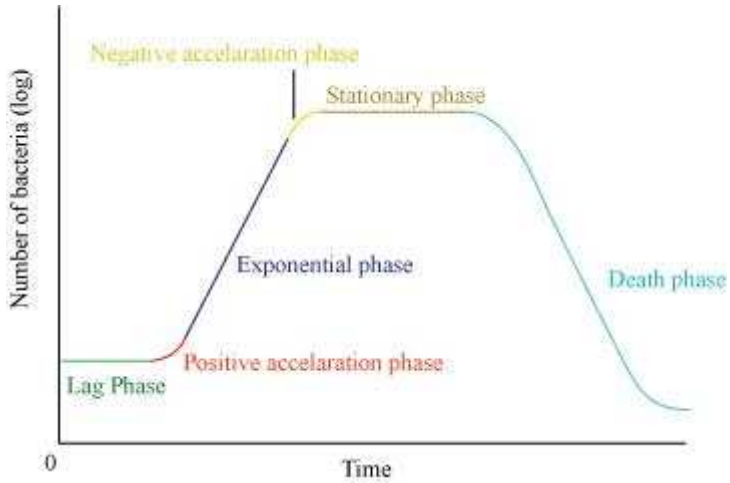
(a) Lag phase: Initially, the population of the yeast cell is very small. This is because of the limited resource present in the habitat.

(b) Positive acceleration phase: During this phase, the yeast cell adapts to the new environment and starts increasing its population. However, at the beginning of this phase, the growth of the cell is very limited.

(c) Exponential phase: During this phase, the population of the yeast cell increases suddenly due to rapid growth. The population grows exponentially due to the availability of sufficient food resources, constant environment, and the absence of any interspecific competition. As a result, the curve rises steeply upwards.

(d) Negative acceleration phase: During this phase, the environmental resistance increases and the growth rate of the population decreases. This occurs due to an increased competition among the yeast cells for food and shelter.

(e) Stationary phase: During this phase, the population becomes stable. The number of cells produced in a population equals the number of cells that die. Also, the population of the species is said to have reached nature's carrying-capacity in its habitat.



A Verhulst–pearl logistic curve is also known as an S-shaped growth curve.

Question 17:

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.

Answer

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

Parasitism is an interaction between two species in which one species (parasite) derives benefit while the other species (host) is harmed. For example, ticks and lice (parasites) present on the human body represent this interaction where in the parasites receive benefit (as they derive nourishment by feeding on the blood of humans). On the other hand, these parasites reduce host fitness and cause harm to the human body.

Question 18:

List any three important characteristics of a population and explain

Answer

A population can be defined as a group of individuals of the same species, residing in a particular geographical area at a particular time and functioning as a unit. For example, all human beings living at a particular place at a particular time constitute the population of humans.

Three important characteristics of a population are:

(a) Birth rate (Natality): It is the ratio of live births in an area to the population of an area. It is expressed as the number of individuals added to the population with respect to the members of the population.

(b) Death rate (Mortality): It is the ratio of deaths in an area to the population of an area. It is expressed as the loss of individuals with respect to the members of the population.

(c) Age Distribution: It is the percentage of individuals of different ages in a given population. At any given time, a population is composed of individuals that are present in various age groups. The age distribution pattern is commonly represented through age pyramids.

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CHAPTER 13

ORGANISMS AND POPULATIONS

POINTS TO REMEMBER

Adaptation : Any attributes of the organism (morphological, physiological, behavioural) that enables the organism to survive and reproduce in its habitat.

Aestivation : Strategy to escape in time during summers (summer sleep). E.g., Snails and some fishes.

Allen.s Rule : Mammals from colder climates generally have shorter ears and limbs to minimise heat loss.

Carrying Capacity : Maximum number of individuals of a population which can be provided with all the necessary resources for their healthy living.

Commensalism : One organism is benefitted while the other is neither harmed nor benefitted except to a negligible extent.

Competition : Rivalry between two organisms for obtaining the same resources.

Ectoparasite : Parasites which live on the surface of their host.

Emigration : Number of individuals of the population who have left the habitat and gone elsewhere during a given time period.

Exponential Growth Curve : Shows that if food and space for a population are unlimited and each species has the ability to grow, then the population grows in exponential or geometric ratio.

Hibernation : Strategy to escape in time during winters (winter sleep). E.g., Polar bears.

Homeostasis : Maintaining constancy of internal environment despite varying external environmental conditions.

Immigration : Number of individuals of the same species that have come into the habitat from elsewhere during a given time period.

Ecology : A branch of science that studies the reciprocal relationships between organism and their physical environment. Ecology is basically concerned with four levels of biological organisation. organisms, populations, communities and biomes.

Organisms : Organisms form the basic unit of study in ecology. Organisms with similar features and the potential interbreed among themselves and produce fertile offspring, constitute a species.

Populations : Population is a group of individuals of the same species, inhabiting in a given area. Interspecific competition for basic needs operate among the individuals of a population.

Biological Community : Biological community is constituted by an assemblage of the populations of all different species that live in an area and interact with each other. A biotic community has a distinct species composition and structure.

Biomes : Biome is a very large unit, constituting of a major vegetation type and associate fauna found in a specified zone. Annual variations in the intensity, duration of temperature and precipitation account for the formation of major biomes like desert, rain forest and tundra.

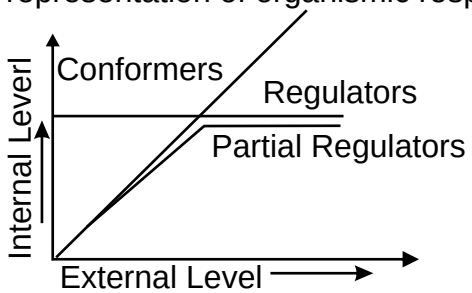
Major Biomass of India : Tropical rain forest, deciduous forest, desert, sea coast. Regional and local variations within each biome lead to the formation of a wide variety of habitats.

Environment : Environment is a sum total of all biotic and abiotic factors that surround and potentially influence an organism. Temperature, water, light and soil are the major abiotic factors. Response to Abiotic Factors :

(i) **Regulators :** Some organisms are able to maintain homeostasis by physiological (Some times behavioural) means which ensures body temperature, constant osmotic concentration. All birds and mammals, a very few lower vertebrates and invertebrates are regulators (Thermoregulation and osmoregulation). For example, human beings maintain their body temperature by sweating in summer and shivering during winter season. Plants do not have such mechanisms to maintain internal temperatures.

(ii) **Conformers :** Majority of animals and nearly all plants cannot maintain a constant internal environment. Their body temperature changes with the ambient temperature. In aquatic animals the osmotic concentration of the body fluids change with that of the ambient water and osmotic concentration. Some species have evolved the ability to regulate, but only over a limited range of environmental conditions, beyond which they simply conform.

A diagrammatic representation of organismic response is shown below.

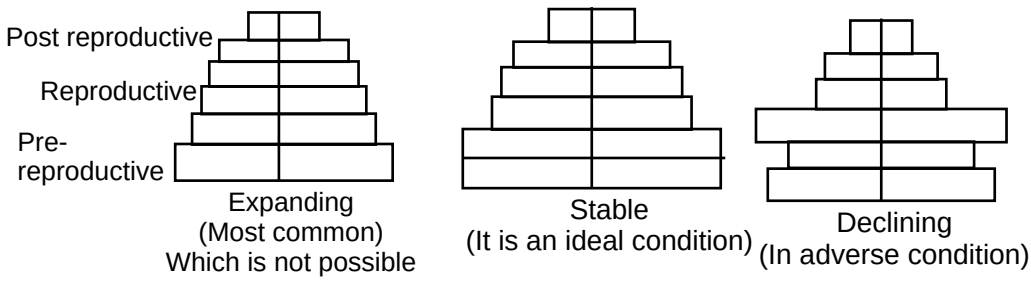


(iii) **Partial regulators :** Hair on the body . Hair on body acts as heat insulator. Surface area and volume ratio . In smaller organisms the surface area is large as compared to the volume. But in large animal this ratio is small. So, the larger animals effectively controls the body temp erature.

(iv) **Migration :** The organisms can move away temporarily from the stressful habitat to a more hospitable area and return when stressful period is over.

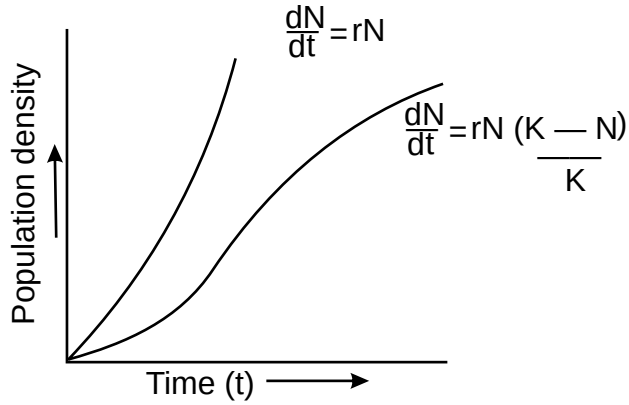
(v) **Suspend :** The organisms may avoid the stress by escaping in time. Bears go into hibernation winter, some snails and fish go into aestivation in summer.

Age Pyraminds of Populations : A population at any given time is composed of individuals of different ages. If the age distribution is plotted for the population, the resulting structure is called an age pyramid. The shape of the pyramids reflects the growth status of the populations (a) Whether it is growing (expanding) (b) Stable or (c) Declining. A pyramids for human population (males and females) are represented below.



Population Growth : If .N. is the population density at time .t., then its density at time t + 1 is :

$$N_{t+1} = N_t + [(B + I) — (D + E)]$$



Where B = The number of births

I = The number of immigrants

D = The number of deaths

E = The number of Emigrants.

N = Population Density

r = Intrinsic rate of natural increase

t = Time period

K = Carrying capacity (The maximum population size that an environment can sustain)

Population Interactions :

Predation : Interaction between species involving killing and consumption of prey is called predation. The species which eats the other is called the predator and the one consumed is termed the prey. The predator keeps check on prey population. The reduction in predator population may lead to increase in prey population.

Competition. In this fitness of one species is significantly lower in presence of another species

Competitive release : A species whose distribution is restricted to a small geographical area because of a competitively superior species, is found to expand its distributional range when the competing species is experimentally removed.

Competitive Exclusion Principle - Two closely related species competing for the same resources cannot co-exist indefinitely and the competitively inferior one will be eliminated.

Resource partitioning . If two species compete for the same reasource, they could avoid competition by choosing different times for feeding.

Commensalism : This is the interactio in which one species benefits and the other is neither harmed nor benefited under normal conditions.

Parasitism : Parasitism is a kind of relationship between two species in which one derives its food from the other (host). Parasitism also involves shelter, in addition to food obtained by a parasite. Parasites may be ectoparasites or endoparasites.

Mutualism : In mutualism both the interacting species are benefited mutually. It is also known as symbiosis.

Co-evolution . 1) Fig species and wasp. Female wasp uses the fruit as an qviposition (egg-laying) and also uses the developing seeds within the fruits for nourishing its larvae. Wasp pollinates the fig inflorescence while searching for egg laying site, in return big offers developing seeds as food for developing larvae. 2) Mediternanean orchid Ophrys and bee.

Amensalism : Interaction between two different species, in which one species is harmed and the other is neither benefited nor harmed.

Examples of Parasitism :

(i) *Cuscuta* growing in shoe flower plant

(ii) Head louse and humans

(iii) *Ascaris, Taenia, Plasmodium* causing diseases in humans

Examples of Brood parasitism :

(i) Koel laying its eggs in crow's nest.

Examples of Commensalism :

(i) Clown fish living among tentacles of sea anemone

(ii) Pilot fish (Remora) accompanies sharks

(iii) Orchid growing on mango tree

(iv) Sea anemone on the shell of hermit crab

(v) Barnacles on back of whales

(vi) Egret and grazing cattle

Examples of Mutualism

(i) Mycorrhiza living in roots of higher plants

(ii) *Rhizobium* in root nodules of legumes

(iii) Algae and fungi in lichens

(iv) Orchid *Ophrys* and bee for pollination (employs sexual deceit)

Example of Amensalism

(i) *Penicillium* whose toxin kills many bacteria is neither benefitted nor harmed

Examples of Predation

(i) Biological control methods to control pests

(ii) Carnivorous animals like tiger eating deers, snake eating frog

(iii) Insectivorous plants like Nepenthes, Drosera, Utricularia

Growth Models : The two growth models are :

(i) **Exponential growth model :**

Exponential Growth Equation is $N_t = N_o e^{rt}$

Where

Nt = Population density after time t

N0 = Population density at time zero

r = intrinsic rate of natural increase

e = the base of natural logarithms (2.71828)

(ii) **Logistic growth model :**

Verhulst-Pearl Logistic Growth is described by the following equations :

dN/dt = rN (K—N / N)

Where N = Population density at time t

r = Intrinsic rate of natural increase

K = Carrying capacity

(i) **Exponential growth** ('J' shape curve is obtained).

* When responses are not limiting the growth.
* Any species growth exponentially under unlimited resources conditions can reach enormous population densities in a short time.
* Growth is not so realistic.

(ii) **Logistic Growth** (Sigmoid curve is obtained)

* When responses are limiting the Growth.
* Resources for growth for most animal populations are finite and become limiting.
* The logistic growth model is a more realistic one.

QUESTIONS

VSA (1 MARK)

1. Which are the factor responsible for the wide variety of habitat formed within each biome?

2. Fresh water animals are unable to survive for long in sea water. Give reason.

3. With which population growth model is the Verhulst Pearl equation associated?

4. Define diapause. Which organisms exhibit it?

5. Calculate the death rate if 6 individuals in a laboratory population of 60 fruit flies died during a particular week.

6. In biological control method, one living organism is used against another to check its uncontrolled growth. Which kind of population interaction is involved in this?

7. An organism has to overcome stressful condition for a limited period of time. Which strategies can it adopt to do so?

8. Write what do phytophagous insects feed on?

SA-II (2 MARKS)

9. What are the four levels of biological organisation with which ecology basically deals?

10. Differentiate between stenohaline and euryhaline organisms.

11. List four features which enable the Xeric plants to survive in the desert conditions.

12. Mention the attributes which a population has but not an individual organism.

13. Differentiate between stenothermal and eurythermal organisms.

14. What are the four ways through which the living organisms respond to abiotic factors?

15. Why do clown fish and sea anemone pair up? What is this relationship called?

SA-I (3 MARKS)

16. How does the shape of age pyramid reflect the growth status of a population?

17. Darwin showed that even a slow growing animal like elephant could reach enormous number in absence of checks. With the help of your understanding of growth models, explain when is this possible? Why is this notion unrealistic?

18. How will you measure population density in following cases?

    (i) fish in a lake

    (ii) tiger census in a national park

    (iii) single huge banyan tree with large canopy.

19. Species facing competition might evolve mechanism that promotes coexistence rather than exclusion. Justify this statement in light of Gause.s competitive exclusion principle, citing suitable examples.

LA (5 MARKS)

20. What is altitude sickness? What its causes and symptoms? How does human body try to overcome altitude sickness?

21. Orchid flower, *Ophrys* co-evolves to maintain resembelance of its petal to female bee. Explain how and why does it do so?

ANSWERS

VSA (1 MARK)

1. Regional and local variations

2. Due to osmotic problems.

3. Logistic Growth.

4. A stage of suspended development, zooplanktons.

5. 6/60 =0.1 individuals per fruitfly per week.

6. Predation.

7. (i) Migration

   (ii) Suspension of active life by hibernation/aestivation/spore formation.

8. Plant sap and other parts of plant.

SA-II (2 MARK)

9. Organisms, population, communities and biomes.

10. **Euryhaline :** Organisms tolerant in wide range of salinities.

    Stenohaline : Organisms tolerant to narrow range of salinities.

11. (i) thick cuticle

    (ii) Stomata in deep pits

    (iii) Stomata closed during day time

    (iv) leaves reduced to spines (CAM photosynthetic pathway).

12. Birth rate, Death rate, Sex ratio, age groups.

13. **Eurythermal :** Organisms that can tolerate and thrive in wide range of temperatures

    Stenothermal : Organisms restricted to a narrow range of temperature.

14. (i) Regulate (ii) Conform (iii) migrate (iv) Suspend

15. Clown fish lives in tentacles of sea Anemone and gets protection from predators.

    Interaction . commeasalisn.

SA-I (3 MARKS)

16. Shape of pyramids reflects growth statusof the population (a) growing (b) Stable (c) declining.

    Refer page 227, Fig. 13.4, NCERT book, Biology - XII

17. Possible if the growth model is Exponential, i.e., having unlimited resources. Its an unrealistic situation because resources are limited. Hence, it follows logistic growth model.

18. (a) fish caught per trap.

    (b) number per unit area

    (c) percentage cover in biomass.

19. State Gause.s competitive exclusion principle. Mechanisms is resource partitioning. E.g., experiment of Mac Arthur on Warblers (Refer page 325, NCERT book, Biology - XII).

LA (5 MARKS)

20. Breathlessness at high attitudes.

Cause : Low atmospheric pressure at high altitudes due to which body does not get enough oxygen.

Symptoms : Nausea, fatigue and heart palpitations. Body adapts by :

(a) increasing red blood cell production

(b) decreasing binding affinity of haemoglobin

(c) by increasing breathing rate.

21.
- employs .Sexual deceit.
- one petal bears uncanny resemblance to female of the bee.
- Male bee is attracted to what it perceives as a female 'pseudocopulates,' during which pollen dusted on male bee¡¦s body.
- Male bee transfers pollen to another flower when the same bee pseudocopulates with another flower.
- *Ophrys* does so because pollination success will be reduced unless it co-evolves with female bee.