UNIT V

Chapter 10

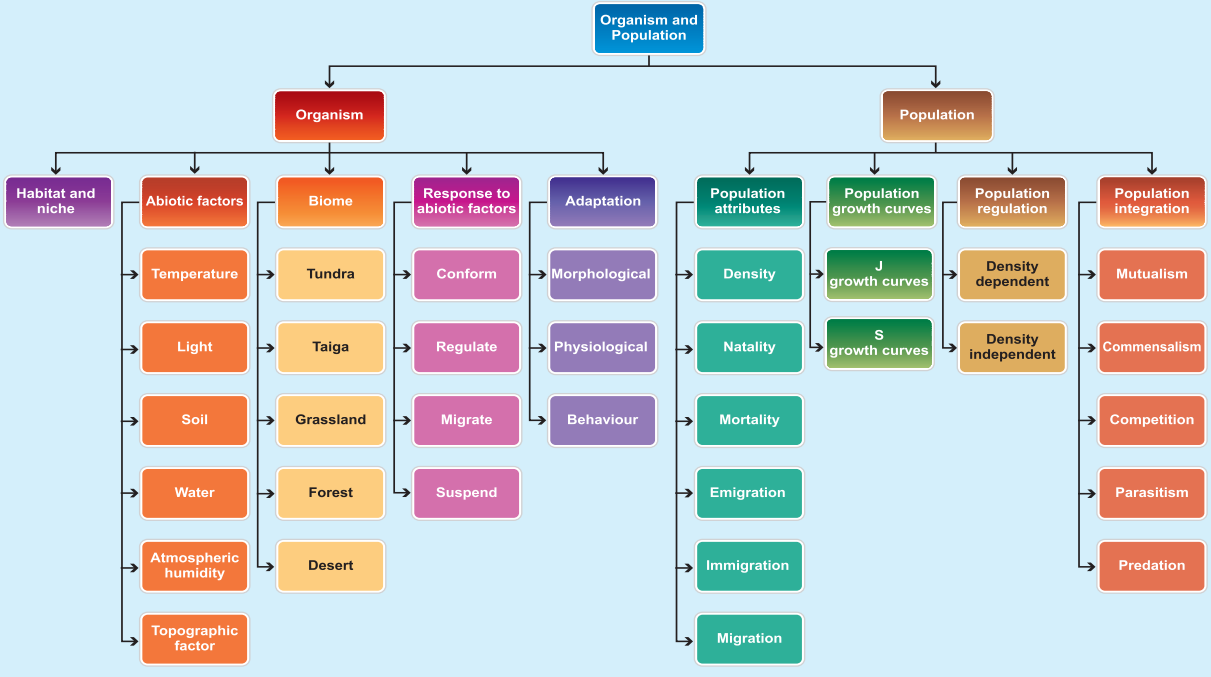
# ORGANISMS AND POPULATIONS

## CHAPTER SNAPSHOT





## Concept Map



## MUST KNOW DEFINITIONS



| | | |
|---|---|---|
| **Community** | : | Community includes all the populations occupying a given area. |
| **Habitat** | : | **Habitat is a place** where an organism or a community of organisms live, including all living and non living factors or conditions of the surrounding environment. |
| **Ecological niche** | : | The physical space occupied by an organism. |
| **Abiotic factors** | : | The abiotic factors include the chemical and physical factors which influence or affect organisms and their functioning in their environment. |
| **Eurytherms** | : | Organisms which can survive a wide range of temperature are referred to as *eurytherms* |
| **Stenotherms** | : | Organisms which can tolerate only a narrow range of temperature are *stenotherms*. |
| **Pedosphere** | : | The soil zone is known as *pedosphere*. |
| **Acclimatization** | : | Animals are known to modify their response to environmental changes (stress) in reasonably short time spans. This is known as *acclimatization*. |
| **Biomes** | : | *Biomes* are large regions of earth that have similar or common vegetation and climatic conditions. |
| **Hibernation** | : | Winter sleep of animals |
| **Aestivation** | : | Summer sleep of animals |
| **Diapause** | : | Some lower animals suspend a certain phase of their life cycle. This is called diapause. |
| **Birth rate** | : | $\frac{\text{No of birth per unit time}}{\text{average population}}$ |
| **Death rate** | : | $\frac{\text{No of death per unit time}}{\text{average population}}$ |
| **Population density** | : | It is usually expressed as the number of individuals per unit area or volume. **Eg.** 100 Trees per acre. |
| **Crude density** | : | It is the size of a population in relation to the numbers per unit of total space. **Eg.** 1000 fish in a pond. |
| **Ecological density** | : | It is the size of a population in relation to the numbers per unit of habitat space. **Eg.** 1000 fish in the volume of water in the pond. |
| **Migration** | : | Mass population movement from one place to another and back. |
| **Immigration** | : | Migration of individuals into the population area. |
| **Emigration** | : | Migration of individuals out of the population areas. |
| **Intraspecific Interaction** | : | Interaction within the members of same. |
| **Interspecific Interaction** | : | Interaction among organisms of different species. |

# Evaluation

**1.** All populations in a given physical area are defined as
(a) Biome (b) Ecosystem
(c) Territory (d) Biotic factors
[*Ans.* (a) Biome]

**2.** Organisms which can survive a wide range of temperature are called
(a) Ectotherms (b) Eurytherms
(c) Endotherms (d) Stenotherms
[*Ans.* (b) Eurytherms]

**3.** The interaction in nature, where one gets benefit on the expense of other is _____.
(a) Predation (b) Mutualism
(c) Amensalism (d) Commensalism
[*Ans.* (d) Commensalism]

**4.** Predation and parasitism are which type of interactions?
(a) (+,+) (b) (+, O)
(c) (–, –) (d) (+, –)
[*Ans.* (d) (+, –)]

**5.** Competition between species leads to
(a) Extinction (b) Mutation
(c) Amensalism (d) Symbiosis
[*Ans.* (a) Extinction]

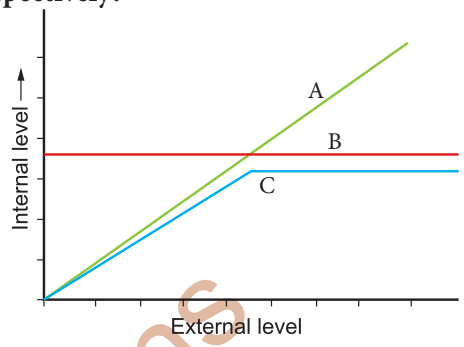
**6.** Which of the following is an r-species?
(a) Human (b) Insects'
(c) Rhinoceros (d) Whale
[*Ans.* (b) Insects]

**7.** Match the following and choose the correct combination from the options given below.

| Column I | | Column II | |
|---|---|---|---|
| A. | Mutaulism | 1. | Lion and deer |
| B. | Commensalism | 2. | Round worm and man |
| C. | Parasitism | 3. | Birds compete with squirrels for nuts |
| D. | Competition | 4. | Sea anemone on hermit crab |
| E. | Predation | 5. | Barnacles attached to whales |

Dispersal
a) A-4, B-5, C-2, D-3, E-1
b) A-3, B-1, C-4, D- 2, E-5
c) A-2, B-3, C-1, D- 5, E-4
d) A-5, B-4, C-2, D- 3, E-1
[*Ans.* (a) A- 4, B-5, C-2, D –3, E-1]

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

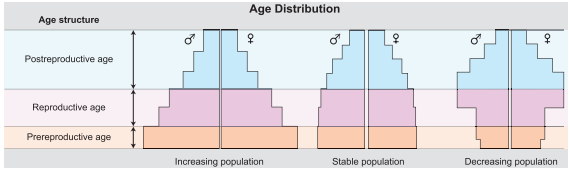



| S. No | A | B. | C |
|---|---|---|---|
| a. | **Conformer** | **Regulator** | **Partial Regulator** |
| b. | Regulator | Partial Regulator | Conformer |
| c. | Partial Regulator | Regulator | Conformer |
| d. | Regulator | Conformer | Partial Regulator |

[*Ans.* (a) Conformer-Regulator-Partial Regulator]

**9.** The relationship between sucker fish and shark is _____.
(a) Competition (b) Commensalism
(c) Predation (d) Parasitism.
[*Ans.* (b) Commensalism]

**10.** What type of human population is represented by the following age pyramid?




(a) Vanishing population
(b) Stable population
(c) Declining population
(d) Expanding population
[*Ans.* (b) Stable population]

**26. Differentiate Natality and Mortality.**

**Ans.**

| S. No. | Natality | Mortality |
|---|---|---|
| 1. | Natality is equivalent to birth rate and is an expression of the production of new individuals in the population by birth, hatching, germination (or) fission. | Mortality is the population decline factor and is opposite to natality. |
| 2. | Natality rate may be expressed in crude birth rate number of organisms born per female per unit time. | Mortality is expressed as specific mortality, that is, the number of members of an original population dying after the lapse of a given time. |
| 2. | Birth rate (b) = $\frac{\text{No of birth per unit time}}{\text{average population}}$ | Death rate (d) = $\frac{\text{No of deaths per unit time}}{\text{average population}}$ |

**27. Differentiate J and S shaped curve.**

**Ans.**

| S. No. | J shaped curve | S shaped curve |
|---|---|---|
| 1. | This growth pattern curve is obtained when a population increases rapidly in an exponential fashion and then stops abruptly due to environmental resistance or due to sudden appearance of limiting factor. | This growth pattern curve is obtained when a population increases slowly at first, then more rapidly and gradually slows down as environmental resistance increases whereby equilibrium is reached and maintained. |
| 2. | The curve is 'J' shaped. | The curve is 's' shaped or sigmoid. |

**28. Give an account of population regulation.**

**Ans.** *(i)* The inherent tendency of all animal populations is to increase in number. But it does not increase indefinitely. Once the carrying capacity of the environment is reached, population numbers remain static or fluctuate depending on environmental conditions. This is regulated by many factors which are:

1. Density independent – Extrinsic factors
2. Density dependent - Intrinsic factors

*(ii)* Extrinsic factors include availability of space, shelter, weather, food, etc. Intrinsic factors include competition, predation, emigration, immigration and diseases.

**29. What is ecological density, crude density and population density?**

**Ans.** *(i)* **Ecological density:** It is the size of a population in relation to the numbers per unit of habitat space. (Available area or volume that can be colonized by a population). **Eg.** 1000 fish in the volume of water in the pond.

*(i)* **Crude density:** It is the size of a population in relation to the numbers per unit of total space. **Eg.** 1000 fish in a pond.

*(ii)* **Population density:** It is usually expressed as the number of individuals per unit area or volume. **Eg.** 100 trees per acre.

**30. Give an account of the properties of soil.**

**Ans.** It is a mixture of organic matter, minerals, gases, liquids and organisms that together support life.

*(i)* **Texture of soil** – The texture of soil is determined by the size of the soil particles. The types of soil include sand, silt and clay on the basis of their size differences.

*(ii)* **Porosity** – The space present between soil particles in a given volume of soil are called pore spaces. The percentage of soil volume occupied by pore space or by the interstitial spaces is called porosity of the soil.

*(iii)* **Permeability of soil** - The characteristic of soil that determines the movement of water through pore spaces is known as soil permeability. Soil permeability is directly dependent on the pore size. Water holding capacity of the soil is inversely dependent on soil porosity.

*(iv)* **Soil Temperature** - Soil gets its heat energy from solar radiation, decomposing organic matter, and heat from the interior of earth. Soil temperature effects the germination of seeds, growth of roots and biological activity of soil-inhabiting micro-and macro-organisms.

*(v)* **Soil water** - In soil, water is not only important as a solvent and transporting agent, but also maintains soil texture, arrangement and compactness of soil particles, making soil habitable for plants and animals.

**31. Differentiate between Tundra and Taiga Biomes.**

*Ans.*

| No. | Tundra Biome | Taiga Biomes |
|---|---|---|
| 1. | This is almost treeless plain in the northern parts of Asia, Europe and North America. | The Taiga is 1300 - 1400 km wide zone south of the Tundra |
| 2. | Winters are long with little daylight, summers are short, with long daylight hours. | This area has long and cold winters. Summer temperature ranges from 10°c to 21°c. |
| 3. | Precipitation is less than 250 mm per year. It is a zone of permafrost | Precipitation ranges between 380-1000 mm annually. |
| 4. | Dwarf willows, birches, mosses, grasses, sedges are the flora here. | The Taiga is a forest of coniferous trees such as spruce, fir and pine. |
| 5. | Reindeer, arctic hare, musk ox, lemmings are important Tundra herbivores. Some important carnivores are the arctic fox,arctic wolf, bobcat and snowy owl. Polar bears live along coastal areas. | Important migratory herbivores include moose, elk, deer and reindeer. Moose and reindeer migrate to the Taiga for winter and to the Tundra for summers. The common smaller mammals are herbivorous squirrels, snowshoe hare and predatory pine martens. Important predators include the timber wolf, grizzly bear, black bear, bobcat and wolverines. |

**32. List the adaptations seen in terrestrial animals.**

*Ans.*

*(i)* Earthworms, land planarians secrete a mucus coating to maintain a moist situation for burrowing, coiling, respiration, etc.

*(ii)* Arthropods have an external covering over the respiratory surfaces and well-developed tracheal systems.

*(iii)* In vertebrate skin, there are many cellular layers besides the well protected respiratory surfaces that help in preventing loss of water.

*(iv)* Some animals obtain their water requirement from food as partial replacement of water lost through excretion.

*(v)* Birds make nests and breed before the rainy season as there is availability of abundant food. But during drought birds rarely reproduce.

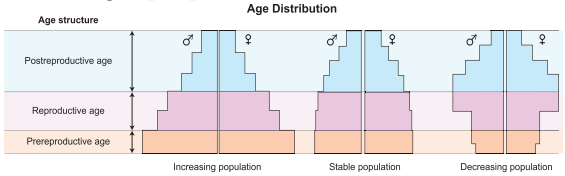
*(vi)* Camels are able to regulate water effectively for evaporative cooling through the skin and respiratory system and excrete highly concentrated urine, and can also withstand dehydration up to 25% of their body weight.

**33. Describe Population Age Distribution.**

*Ans.*

*(i)* The proportion of the age groups (pre-reproductive, reproductive and post reproductive) in a population is its age distribution attribute. This determines the reproductive status of the population at the given time and is an indicator of the future population size.

*(ii)* Usually a rapidly growing population will have larger proportion of young individuals. A stable population will have an even distribution of various age classes. A declining population tends to have a larger proportion of older individuals.

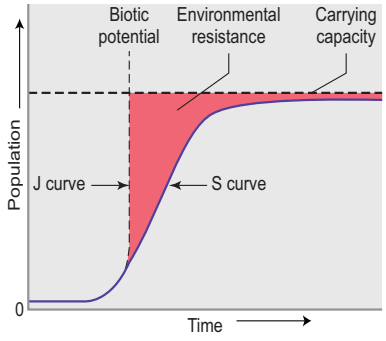



**34. Describe Growth Models/Curves.**

*Ans.* Populations show characteristic growth patterns or forms. These patterns can be plotted and termed as J-shaped growth form and S-shaped growth form (Sigmoid form).

*(i)* **J shaped growth form:** When a population increases rapidly in an exponential fashion and then stops abruptly due to environmental resistance or due to sudden appearance of a limiting factor, they are said to exhibit J-shaped growth form. Many insects show explosive increase in number during the rainy season followed by their disappearance at the end of the season .

*(ii)* **S-Shaped growth form (sigmoid growth):** Some populations, as in a population of small mammals, increase slowly at first then more rapidly and gradually slow down as environmental resistance increases whereby equilibrium is reached and maintained. Their growth is represented by S shaped growth curve.




**J shaped and S shaped growth curves**

## ZOOLOGY LONG VERSION QUESTIONS (FOR PURE SCIENCE GROUP)

**Q.No. 1 to 34 Refer Evaluation.**

**35. Tabulate and analysis of two species population interaction.**

***Ans.***

| S. No. | Types of Interation | Species 1 | Species 2 | GENERAL NATURE OF INTERACTION | EXAMPLES |
|---|---|---|---|---|---|
| 1. | Amensalism | - | 0 | The most powerful animal or large organisms inhibits the growth of other lower organisms | Cat and Rat |
| 2. | Mutualism | + | + | Interaction favorable to both and obligatory | Between crocodile and bird |
| 3. | Commensalism | + | 0 | Population 1, the commensal benefits, while 2 the host is not affected | Sucker fish on shark |
| 4. | Competition | - | - | Direct inhibition of each species by the other | Birds compete with squirrels for nuts and seeds. |
| 5. | Parasitism | + | - | Population 1, the parasite, generally smaller than 2, the host | *Ascaris* and tapeworm in human digestive tract. |
| 6. | Predation | + | - | Population 1, the predator, generally larger than 2, the prey | Lion predatory on deer |

**36. Explain parasitism with an example.**

***Ans.*** ***(i)*** **PARASITISM (+, –):** It is a kind of harmful interaction between two species, wherein one species is the 'parasite' and the other its 'host'. The parasite benefits at the expense of the host. A parasite derives shelter, food and protection from the host.

***(ii)*** Parasites exhibit adaptations to exploit their hosts.

***(iii)*** The parasites may be viral parasites (plant / animal viruses), microbial parasites (**Eg:** bacteria / protozoa / fungi), phytoparasites (plant parasites) and zooparasites (animal parasites such as Platyhelminthes, nematodes, arthropods).

***(iv)*** **Ectoparasites:** Parasites may inhabit or attach to the surface of the host **Eg.** Head lice, Endo parasites which live within the body of the host **Eg.** Tapeworm in human Intestine.

*(v)* Parasites may be permanent or temporary. **Temporary parasites** spend only a part of their life cycle as parasites. For example, Glochidium larva of *Anadonia* (fresh water mussel) attaches itself to the body of fish. **Permanent parasites** spend their life completely dependent on their host organism. **Eg.** *Plasmodium*.

**37. Differentiate between predator and prey.**



***Ans.***

| S. No. | Predator | Prey |
|---|---|---|
| 1. | The animal which kills another animal for its food is called a Predator | The animal which gets killed by the Predator is called Prey. |
| 2. | A Predator is larger than the prey. The predator catches the prey externally and then consumes it. | The prey is smaller than the predator. |
| 3. | Predator finds means to catch their prey **Eg:** Lion is a predator. | Prey finds means to escape from their predators and develop adaptations for the same. **Eg:** Deer is a prey for Lions and Tigers. |

# Additional Questions and Answers

## Choose the Correct Answer — 1 Mark

### I. Choose the Correct options for the below Questions

**1.** The word 'niche' was first used by _____.
a) Charles Elton b) Van't Hoff
c) Bergmann d) Jordon
[***Ans.*** **(a) Charles Elton]**

**2.** Van't Hoff's rule describes the impact of _____ on the environment.
a) Light b) Temperature
c) Water d) Soil
[***Ans.*** **(b) Temperature]**

**3.** "Birds and mammals attain greater body size in colder regions than warmer regions." – Choose the correct option.
a) Bergmann's rule b) Jordon's rule
c) Sewall wright effect d) Allen's rule
[***Ans.*** **(a) Bergmann's rule]**

**4.** Which of the following is a behavioural adaptation?
a) Thick fur b) camouflage
c) Sharp canines d) Migration
[***Ans.*** **(d) Migration]**

**5.** Identify the response under which 'Osmotic balance' can be classified.
a) Suspend b) Regulate
c) Migrate d) Conform
[***Ans.*** **(b) Regulate]**

**6.** Type of response in hibernation and aestivation.
a) Suspend b) Regulate
c) Migrate d) Conform
[***Ans.*** **(a) Suspend]**

### II. Choose the Correct options for the below Fill in the bla nks:

**1.** Animals destroyed at the feet of elephants is an example of _____
a) Mutualism b) Amensalism
c) Commensalism d) parasitism
[***Ans.*** **(b) Amensalism]**

**2.** Birds sitting on cows to eat insects is an example of _____.
a) Competition b) Mutualism
c) Commensalism d) Amensalism
[***Ans.*** **(c) Commensalism]**

**3.** Nuts are eaten by birds and squirrels. This is an example of an interaction called _____.
a) Commensalism b) Mutualism
c) Amensalism d) Competition
[***Ans.*** **(d) Competition]**

**4.** 1000 fish in the volume of water in the pond indicates _____
a) Relative abundance
b) Ecological density
c) Crude density
d) Population density
[***Ans.*** **(b) Ecological density]**

**5.** Diapause is a type of response classified under _____.
a) Suspend b) Migrate
c) Conform d) Regulate
[***Ans.*** **(a) Suspend]**

**Reason:** It is a feature of Taiga biome whereas the others are features of Tundra Biome.

**4.** (a) Bacteria in calcium
(b) Cross pollination by bees
(c) Sucker fish and shark
(d) Sea anemone and hermit crab

**[Ans. (c) Sucker fish and shark]**

**Reason:** It is an example of commensalism whereas the others are examples of mutualism.

## ANSWER IN ONE WORD*

**1.** Greek word from which the term 'ecology' is derived _____ . **[Ans. Eikos]**

**2.** Another name for soil zone _____ **[Ans. pedosphere]**

**3.** Growth of an organism in response to light _____ **[Ans. phototropism]**

**4.** Change in locomotion of a organism in response to light intensity _____ **[Ans. photokinesis]**

**5.** Movement of an organism in response to light _____ **[Ans. phototaxis]**

**6.** Process of soil formation _____ **[Ans. pedogenesis]**

**7.** Organisms which can withstand a narrow range of temperature _____ **[Ans. stenotherms]**

**8.** Organisms which can withstand a wide range of temperature _____ **[Ans. Eurytherms]**

**9.** Scientist who coined the term 'niche' _____ **[Ans. Charles Elton]**

**10.** Instrument to measure speed of wind _____ **[Ans. Anemometer]**

**11.** Zone of permafrost _____ **[Ans. tundra]**

**12.** Type of forest in taiga _____ **[Ans. coniferous forest]**

**13.** Modification of responses of animals in response to environment within a short span of time _____. **[Ans. acclimatization]**

**14.** Zone between timberline and snow zone _____ **[Ans. alpine biome]**

**15.** Desert which receives the lowest rainfall _____. **[Ans. Atacama desert (Chile)]**

**16.** Animals which change their body temperature according to surroundings show which type of response? _____ **[Ans. conform]**

**17.** Animals which suspend a certain phase of the life cycle by an organism _____ **[Ans. diapause]**

**18.** Scientific study of animal behaviour structural _____. **[Ans. Ethology]**

**19.** Structural feature in aquatic animals which gives buoyancy _____. **[Ans. air bladders]**

**20.** Death rate is also known as _____ **[Ans. Mortality]**

**21.** Migration of individuals into the population area _____ **[Ans. immigration]**

**22.** Instrument to measure humidity _____ **[Ans. hygrometer]**

* Only for quick revision not in pattern

## VERY SHORT ANSWERS 2 Marks

**1. What are ecological equivalents?**

**Ans.** Species that occupy the same niche in different geographical regions, are termed 'ecological equivalents'.

**2. Define 'niche'.**

**Ans.** Niche of an organism can be defined as the total position and function of an individual in its environment.

**3. State Bergmann's rule.**

**Ans.** Birds and mammals attain greater body size in colder regions than warmer regions (Bergmann's rule).

**4. State Allen's rule.**

**Ans.** Warm blooded animals, living in colder climates, tend to have shorter limbs, ears and other appendages when compared to the members of the same species in warmer climates.

**5. State Jordon's rule.**

**Ans.** In some aquatic environments, an inverse relationship between water temperature and fish meristic characters is observed - lower the temperature, more the vertebrae.

**6. Mention the important behavioural adaptations seen is animals.**

**Ans.** Migration and Courtship

**7. What is Ethology?**

**Ans.** Ethology is the scientific study of animal behaviour, under natural conditions.

**8. Name the physiological adaptations seen in animals.**

**Ans.** Hibernation and aestivation.

**9. What is the significance of lateral-line system in fishes'?**

**Ans.** They function as Rheoreceptors which is helpful in echolocating objects in water.

**10. Name the types of migration in fishes.**

**Ans.** **(i)** **Anadromous migration** – migration of fishes from sea to fresh water. **Eg.** Salmon.

**(ii)** **Catadromous migration** – migration of fishes from fresh water to sea. **Eg.** Eel

**11. Define biotic potential.**

**Ans.** It is the maximum reproductive capacity of an organism under optimum environmental conditions.

**12. Define carrying capacity.**

**Ans.** The maximum number of organism that a region can support without environmental degradation is called carrying capacity.

**13. What is amensalism?**

**Ans.** This is the ecological interaction in which an individual species harm another without obtaining benefit, large powerful animals harm weak animals. **Eg.** animals destroyed at the feet of elephants.

**14. What is commensalism ? Give an example.**

**Ans.** This defines the interaction in which two or more species are mutually associated in activities centering on food and one species at least, derives benefit from the association while the other associates are neither benefited nor harmed. **Eg.** Barnacles attached to Whales travel thousands of miles collecting and filtering food from the moving water. The whales are not affected by the barnacles.



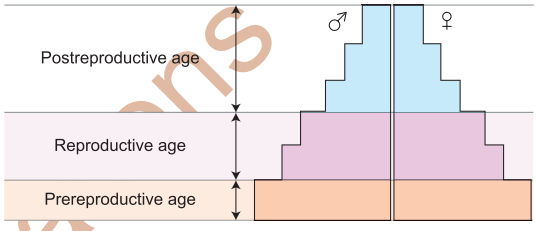
**15. What is competitive exclusion principle?**

**Ans.** When resources are in more than adequate to meet the demands of the organisms seeking them, competition does not occur, but when inadequate to satisfy the need of the organisms seeking them, the weakest, least adapted, or least aggressive individuals are often forced to face challenges. This phenomenon is known as the **competitive exclusion** principle of Hardin.

## SHORT ANSWERS — 3 Marks

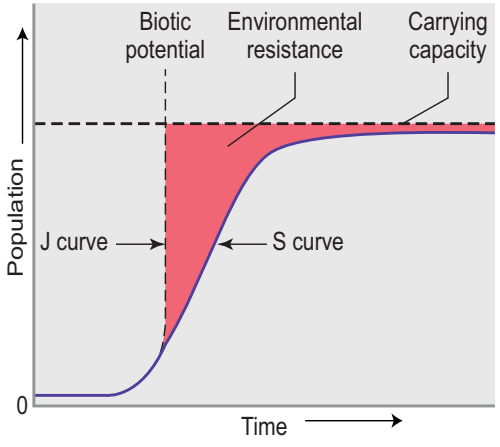
**1. Draw a diagram to show age distribution in a increasing population.**

**Ans.**




**2. Draw a sketch to show J and S shaped growth form of a population.**

**Ans.**




**J shaped and S shaped growth curves**

**3. How is the camel able to withstand desert conditions?**

**Ans.** **(i)** The camel is able to use water efficiently and effectively for evaporative cooling through their skin and respiratory system.

**(ii)** They excrete highly concentrated urine and can also withstand dehydration up to 25% of the body weight.

**(iii)** The hoofs and hump are also suitable adaptations for survival in this dry sandy environment.

**15. Define migration.**

**Ans.** Migration is a peculiar and unique kind of mass population movement from one place to another and back. To avoid the severe winter cold. **Eg.** Siberian cranes migrate from Siberia to Vedanthangal in Tamil Nadu and return back in spring.

**16. Differentiate temporary parasites and permanent parasites.**

**Ans.**

| S. No. | Temporary Parasites | Permanent Parasites |
|---|---|---|
| 1. | Temporary parasites spend only a part of their life cycle as parasites. | Permanent parasites spend their life completely as parasites and are dependent on their host organism. |
| 2. | **Eg.** Glochidium larva of *Anedonia* attaches itself to the body of a fish. | **Eg.** Tapeworm in human intestine |

## Long Answers — 5 Marks

**1. List the adaptations of aquatic animals.**

**Ans.**
- ***(i)*** The pectoral fins and dorsal fins act as stabilizers or balancers and the caudal fin helps in changing the direction as a rudder.
- ***(ii)*** Arrangement of body muscles in the form of bundles (myotomes) help in locomotion.
- ***(iii)*** Stream lined structure helps in the swift movement of the animals in water.
- ***(iv)*** Respiration by gills making use of gases dissolved in water.
- ***(v)*** Presence of air-bladders filled with air for buoyancy.
- ***(vi)*** Presence of lateral-line system. They function as rheoreceptors which is helpful in echolocating objects in water.
- ***(vii)*** Integuments rich in mucous glands are protected by scales.
- ***(viii)*** Maintain water and ionic balance in its body with excretory structures.



**2. List the differences between R selected and K selected species.**

**Ans.**

| S. No | R selected species | K selected species |
|---|---|---|
| 1. | Smaller sized organisms. | Larger sized organisms. |
| 2. | Produce many offspring | Produce few offspring |
| 3. | Mature early | Late maturity with extended parental care |
| 4. | Short life expectancy | Long life expectancy |
| 5. | Each individual reproduces only once or few times in their life time | Can reproduce more than once in lifetime |
| 6. | Only few reach adulthood | Most individual reach maximum life span |
| 7. | Unstable environment density independent | Stable environment, density dependent |

**3. Write the characteristics of tundra.**

**Ans.**
- ***(i)*** Extremely cold climate
- ***(ii)*** Low biotic diversity
- ***(iii)*** Simple vegetation structure
- ***(iv)*** Limitation of drainage
- ***(v)*** Short season of growth and reproduction
- ***(vi)*** Energy and nutrients in the form of dead organic material
- ***(vii)*** Large population oscillations

**4. Write about the essential properties of water.**

**Ans.** **Essential properties of water**
- ***(i)*** Water is one of the main agents in Pedogenesis (soil formation).
- ***(ii)*** It is the medium for several different ecosystems.
- ***(iii)*** It is present as moisture in the atmosphere and the outer layers of the lithosphere and is uneven in distribution on the earth.
- ***(iv)*** Water is heavier than air and imparts greater buoyancy to the aquatic medium. This enables organism to float at variable levels.

(v) Water has high heat capacity and latent heat, due to which it can withhold large amounts of heat. Thus, oceans and lakes tend to maintain a relatively constant temperature,and the biosphere is relatively thermostable.

(vi) Water is physically unique because it is less dense as a solid (ice) than as a liquid.

(vii) When water freezes ($0^0$C), it contracts. The maximum density of liquid water occurs at $4^o$C. Below that, it expands markedly. This enables ice to float on the top of water bodies. Hence, only the surface of water bodies will freeze, while below the surface, water will be in liquid form, sustaining life).

(viii) Water is considered as the Universal solvent. It is the main medium by which chemical constituents are transported from abiotic components to the living components of an ecosystem.

(ix) Water has high surface tension. This allows pollen, dust, and even water striders to remain at the surface of a water body even though they are denser than the water.

**5. List out the properties of soil.**

**Ans.** (i) **Texture of soil** – The texture of soil is determined by the size of the soil particles. The types of soil include sand, silt and clayon the basis of their size differences.

(ii) **Porosity** – The space present between soil particles in a given volume of soil are called pore spaces. The percentage of soil volume occupied by pore space or by the interstitial spaces is called porosity of the soil.

(iii) **Permeability of soil** – The characteristic of soil that determines the movement of water through pore spaces is known as soil permeability. Soil permeability is directly dependent on the pore size. Water holding capacity of the soil is inversely dependent on soil porosity.

(iv) **Soil Temperature** – Soil gets its heat energy from solar radiation, decomposing organic matter, and heat from the interior of earth. Soil temperature effects the germination of seeds, growth of roots and biological activity of soil-inhabiting micro- and macro-organisms.

(v) **Soil water** - In soil, water is not only important as a solvent and transporting agent, but also maintains soil texture, arrangement and compactness of soil particles, making soil habitable for plants and animals.

**6. Write a note on grassland biome.**

**Ans.** (i) Grasslands occur in temperate and in the tropical regions.

(ii) They have hot summers, cold winters, and irregular rainfall.

(iii) Often they are characterized by high winds.

(iv) The low irregular rainfall is the factor which makes the difference between a temperate deciduous forest and a temperate grassland.

(v) Herbivores like antelope, bison, wild horse, jack rabbit, ground squirrel and prairie dogs are abundant.

(vi) Predators include coyotes, foxes, hawks and snakes.

(vii) In India, fauna of grasslands includes Elephant, Gaur, Rhino, Antelope.

(viii) Flora of grasslands include purple needle grass, wild oats, foxtail, ryegrass and buffalo grass.