

MULTIPLE-CHOICE QUESTIONS

1. Autecology is the:

- a. Relation of heterogeneous populations to its environment**
- b. Relation of an individual to its environment**
- c. Relation of a community to its environment**
- d. Relation of a biome to its environment**

Solution:

Option (b) is the answer.

2. Ecotone is:

- a. A polluted area**
- b. The bottom of a lake**
- c. A zone of transition between two communities**
- d. A zone of developing community**

Solution:

Option (c) is the answer.

3. Biosphere is:

- a. a component in the ecosystem**
- b. composed of the plants present in the soil**
- c. life in the outer space**
- d. composed of all living organisms present on earth which interact with the physical environment**

Solution:

Option (d) is the answer.

4. The ecological niche is:

- a. the surface area of the ocean**
- b. an ecologically adapted zone**
- c. the physical position and functional role of a species within the community**
- d. formed of all plants and animals living at the bottom of a lake**

Solution:

Option (c) is the answer.

5. According to Allen's Rule, the mammals from colder climates have:

- a. shorter ears and longer limbs**
- b. longer ears and shorter limbs**
- c. longer ears and longer limbs**
- d. shorter ears and shorter limbs**

Solution:

Option (d) is the answer.

6. Salt concentration (Salinity) of the sea measured in parts per thousand is:

- a. 10 – 15
- b. 30 – 70
- c. 0 – 5
- d. 30 – 35

Solution:

Option (d) is the answer.

7. Formation of tropical forests needs mean annual temperature and mean annual precipitation as:

- a. 18 – 25°C and 150 – 400 cm
- b. 5 – 15°C and 50 – 100 cm
- c. 30 – 50°C and 100 – 150 cm
- d. 5 – 15°C and 100 – 200 cm

Solution:

Option (a) is the answer.

8. Which of the following forest plants controls the light conditions at the ground?

- a. Lianas and climbers
- b. Shrubs
- c. Tall trees
- d. Herbs

Solution:

Option (c) is the answer.

9. What will happen to a well-growing herbaceous plant in the forest if it is transplanted outside the forest in a park?

- a. It will grow normally
- b. It will grow well because it is planted in the same locality
- c. It may not survive because of a change in its micro-climate
- d. It grows very well because the plant gets more sunlight

Solution:

Option (c) is the answer.

10. If a population of 50 Paramecium present in a pool increases to 150 after an hour, what would be the growth rate of the population?

- a. 50 per hour
- b. 200 per hour
- c. 5 per hour
- d. 100 per hour

Solution:

Option (d) is the answer.

11. What would be the per cent growth or birth rate per individual per hour for the same population mentioned in the previous question (Question 10)?

- a. 100
- b. 200
- c. 50
- d. 150

Solution:

Option (b) is the answer.

12. A population has more young individuals compared to older individuals. What would be the status of the population after some years?

- a. It will decline
- b. It will stabilise
- c. It will increase
- d. It will first decline and then stabilize

Solution:

Option (c) is the answer.

13. What parameters are used for tiger census in our country's national parks and sanctuaries?

- a. Pugmarks only
- b. Pugmarks and faecal pellets
- c. Faecal pellets only
- d. Actual headcounts

Solution:

Option (b) is the answer.

14. Which of the following would necessarily decrease the density of a population in a given habitat?

- a. Natality > mortality
- b. Immigration > emigration
- c. Mortality and emigration
- d. Natality and immigration

Solution:

Option (c) is the answer.

15. A protozoan reproduces by binary fission. What will be the number of protozoans in its population after six generations?

- a. 128
- b. 24
- c. 64
- d. 32

Solution:

Option (c) is the answer.

16. In 2005, for each of the 14 million people present in a country, 0.028 were born and 0.008 died during the year. Using the exponential equation, the number of people present in 2015 is predicted as:

- a. 25 million
- b. 17 million
- c. 20 million
- d. 18 million

Solution:

Option (b) is the answer.

17. Amensalism is an association between two species where:

- a. one species is harmed and other is benefitted
- b. one species is harmed and other is unaffected
- c. one species is benefitted and other is unaffected
- d. both the species are harmed.

Solution:

Option (b) is the answer.

18. Lichens are an association of:

- a. bacteria and fungus
- b. alga and bacterium
- c. fungus and alga
- d. fungus and virus

Solution:

Option (c) is the answer.

19. Which of the following is a partial root parasite?

- a. Sandalwood
- b. Mistletoe
- c. Orobanch
- d. Ganoderma

Solution:

Option (a) is the answer.

20. Which one of the following organisms reproduces sexually only once in its lifetime?

- a. Banana
- b. Mango
- c. Tomato
- d. Eucalyptus

Solution:

Option (a) is the answer.

VERY SHORT ANSWER TYPE QUESTIONS

1. Species that can tolerate a narrow range of temperature are called ____.

Solution:

Species that can tolerate a narrow range of temperature are called Stenothermal species.

2. What are Eurythmic species?**Solution:**

Eurythmic species are those organisms that can adapt to a wide range of temperature changes.

3. Species that can tolerate a wide range of salinity are called ____.**Solution:**

Species that can tolerate a wide range of salinity are called Euryhaline.

4. Define stenohaline species.**Solution:**

Stenohaline are those species which cannot tolerate fluctuations in the degree of salt in the water.

5. What is the interaction between two species called?**Solution:**

If the interaction is between the same species, it is called intraspecific interaction.

6. What is commensalism?**Solution:**

Commensalism is the type of interaction between two species in which one species gets benefited by the other and the other species does not get affected.

7. Name the association in which one species produces a poisonous substance or a change in environmental conditions that is harmful to another species.**Solution:**

The association in which one species produces a poisonous substance or a change in environmental conditions that is harmful to another species is commensalism.

8. What is Mycorrhiza?**Solution:**

Mycorrhiza is a type of fungi. It grows in association with the plant roots.

9. Emergent land plants that can tolerate the salinities of the sea are called.**Solution:**

Emergent land plants that can tolerate the salinities of the sea are called Mangrove plants.

10. Why do high altitude areas have brighter sunlight and lower temperatures as compared to the plains?**Solution:**

High altitude areas have brighter sunlight and lower temperatures because of thinner atmosphere and absence of dust particle.

11. What is homeostasis?**Solution:**

Homeostasis is the tendency of the organism to maintain a constant internal environment despite varying external environmental conditions like temperature.

12. Define aestivation.

Solution:

Aestivation is a behavioural adaptation to avoid extreme heat and desiccation in the summer season.

13. What are diapause and its significance?

Solution:

Diapause is a type of adaptation to survive during unfavourable conditions. Diapause is a stage of suspended development in some organisms like zooplankton in lakes and ponds.

14. What would be the growth rate pattern, when the resources are unlimited?

Solution:

When the resources are unlimited the growth rate pattern would be exponential.

15. What are the organisms that feed on plant sap and other plant parts called?

Solution:

The organisms that feed on plant sap and other plant parts called Phytophagous. Example insects and other invertebrates.

16. What is high altitude sickness? Write its symptoms.

Solution:

High altitude sickness is also known as mountain sickness. Symptoms are breathlessness, fast breathing, nausea, vomiting, headache etc.

17. Give a suitable example for commensalism.

Solution:

Interaction between cattle egret and grazing cattle is also an example of commensalism. One species is benefitted and other species is unaffected i.e., neither benefitted nor harmed.

18. Define ectoparasite and endoparasite and give suitable examples.

Solution:

Ectoparasite is the parasite that feeds on the external surface of the host organism and generally attaches them during feeding. Example – Lice on humans, ticks on dogs, etc.

Endoparasites are those that live inside the host body at different places like kidney, lungs, red blood cells, etc. Example – human liver fluke, tapeworm, etc.

19. What is brood parasitism? Explain with the help of an example.

Solution:

Brood parasitism is a type of parasitism in which an organism lays eggs on the nest of another organism. Example – cuckoo lays eggs in the nest of its host and the hosts incubate the eggs. The size and colour of both the eggs are similar, this reduces the chances of the host bird detecting the foreign eggs and ejecting them out of the nest.

SHORT ANSWER TYPE QUESTIONS

1. Why are coral reefs not found in the regions from West Bengal to Andhra Pradesh but are found in Tamil Nadu and on the east coast of India?

Solution:

For this, the tropical area is required and also high salinity. The influx of freshwater should not be there and also no silation should occur. All these are found in Tamil Nadu and on the east coast of India but are not found in the regions from West Bengal to Andhra Pradesh.

2. If a freshwater fish is placed in aquarium containing seawater, will the fish be able to survive? Explain giving reasons.

Solution:

If a freshwater fish is placed in an aquarium containing seawater the fish may not survive. Marine or sea fish is exposed to high salt concentration whereas freshwater fish is exposed to low salt concentration.

3. Why do all the freshwater organisms have contractile vacuoles whereas the majority of marine organisms lack them?

Solution:

Freshwater fish are exposed to low salt concentration. So, they require contractile vacuoles to remove excess water.

4. Define heliophytes and sciophytes. Name a plant from your locality that is either heliophyte or sciophyte.

Solution:

Heliophytes are also known as sun-loving plants and for their optimum growth, they need high-intensity sunlight. Example Thyme, sunflower etc.

Sciophytes are also known as shade-loving plants. They require low-intensity sunlight for optimum growth. Example is Lycopodium.

5. Why do submerged plants receive weaker illumination than exposed floating plants in a lake?

Solution:

The sunlight reaches the plant by passing through deep water. Floating plants are exposed to high-intensity sunlight because they float on the surface of the water. Sunlight directly reaches the plant.

6. In a seashore, the benthic animals live in sandy, muddy and rocky substrata and accordingly developed the following adaptations.

a. Burrowing

b. Building cubes

c. Holdfasts / peduncle

Find suitable substratum against each adaptation.

Solution:

a. Sandy

b. Muddy

c. Rocky

6. Categorise the following plants into hydrophytes, halophytes, mesophytes and xerophytes. Give reasons for your answers.

a. Salvinia

b. Opuntia

c. Rhizophora

d. Mangifera

Solution:

- a. Hydrophyte
- b. Xerophyte
- c. Halophyte
- d. Mesophyte

8. In a pond, we see plants which are free-floating; rooted–submerged; rooted emergent; rooted with floating leaves. Write the type of plants against each of them.

Solution:

Plant Name	Type
a. Hydrilla
b. Typha
c. Nymphaea
d. Lemna
e. Vallisneria

Solution:

- a. Submerged
- b. Rooted emergent
- c. Rooted with floating leaves
- d. Free- floating
- e. Rooted submerged

9. The density of a population in a habitat per unit area is measured in different units. Write the unit of measurement against the following:

a. Bacteria _____

b. Banyan _____

c. Deer _____

d. Fish _____

Solution:

- a. Nos. / Vol
- b. Coverage / area
- c. Biomass / area
- d. Nos. / area
- e. Wt. / area



10.

a. Label the three tiers 1, 2, 3 given in the above age pyramid.

b. What type of population growth is represented by the above age pyramid?

Solution:

(a) The three tiers represent:

Tier 1: Pre-reproductive population

Tier 2: Reproductive population

Tier 3: Post Reproductive population

(b) The pyramid represents a growing or expanding population as the pre-reproductive and reproductive population is growing.

11. In an association of two animal species, one is a termite which feeds on wood and the other is a protozoan Trichonympha present in the gut of the termite. What type of association do they establish?

Solution:

The association in which one is termite and other is Trichonympha is a type of mutualism relation that is both the interacting species are benefitted.

12. Lianas are vascular plants rooted in the ground and maintain erectness of their stem by making use of other trees for support. They do not maintain a direct relationship with those trees. Discuss the type of association the lianas have with the trees.

Solution:

The association in which one is Lianas and other is trees is commensalism one species is benefitted and the other is neither benefitted nor harmed The Lianas plant has a long flexible stem, it gets the support of the tree without affecting harming or providing any benefit to the tree.

13. Give the scientific names of any two microorganisms inhabiting the human intestine.

Solution:

The scientific names of two microorganisms inhabiting the human intestine are Escherichia coli and Lactobacillus.

14. What is a tree line?

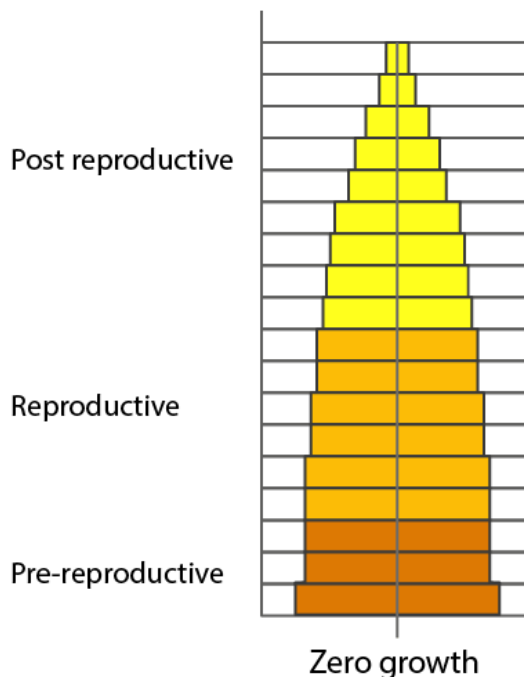
Solution:

Treeline is an altitude beyond which no tree is seen and beyond the tree line, only shrubs and herbs are found.

15. Define 'zero population growth rate'. Draw an age pyramid for the same.

Solution:

Zero Population growth rate is a condition wherein the population neither grows nor declines.



16. List any four characters that are employed in the human population census.

Solution:

Natality and mortality

Sex ratio

Population density

Age distribution

17. Give one example for each of the following types.

a) Migratory animal

b) Camouflaged animal

c) Predator animal

d) Biological control agent

e) Phytophagous animal

f) Chemical defence agent

Solution:

a) Migratory animal – Siberian crane, salmon, dolphin, etc

b) Camouflaged animal – Grasshopper, chameleon, Frog, etc

c) Predator animal – Tiger, sparrow, lion, etc

d) Biological control agent - Myxoma virus to kill European rabbit, Gambusia fish to check the growth of mosquito larvae, moth against prickly pear cactus, etc

e) Phytophagous animal – Locusta insect, beetle, butterfly, etc

f) Chemical defence agent – Cardiac glycosides produced by Calotropis

18. Fill in the blanks

Species A	Species B	Type of interaction	Example
+	-B.....D.....
+	+C.....E...
+	...A.....	CommensalismF.....

Solution:

A = 0

B = Parasitism

C = Mutualism

D = Commensalism

E = Cuscuta

D = Lichen

E = Orchid or mango branch.

19. Observe the set of 4 figures A, B, C and D and, answer the following questions

- Which one of the figures shows mutualism?
- What kind of association is shown in D?
- Name the organisms and the association in C.
- What role is the insect performing in B?

Fig (A)



Fig (B)



Fig (C)



Fig (D)



Solution:

- Figure A shows mutualism
- Figure D shows an association of predation
- Figure C shows the egrets and grazing cattle.
- In figure B the insect is phytophagous that feed on the sap of the flower.

LONG ANSWER TYPE QUESTIONS

1. Comment on the following figures: 1, 2 and 3:

A, B, C, D, G, P, Q, R, S are species

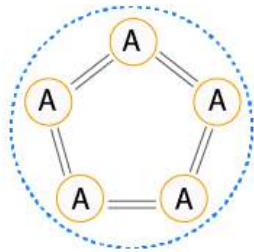


fig 1

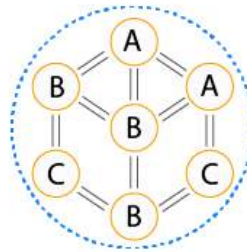


fig 2

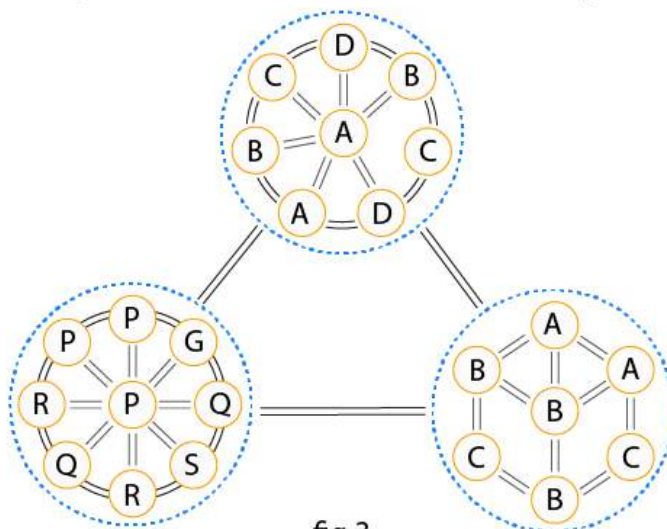


fig 3

Solution:

- Figure 1 shows a single population (A). All individuals of the same species are interacting among themselves and their environment only.
- Figure 2 shows three species which are A, B and C. These three species are interacting among themselves and their environment.
- Figure 3 shows a biome. It has three communities. Each community has a different species. These three communities are interacting with each other and the environment forming a biome.

2. An individual and population have certain characteristics. Name these attributes with definitions.

Solution:

- A population has birth rate (natality) and death rate (mortality) whereas an individual has birth and death.
- Population density: The density is referred to as the individual per unit area and density changes with space and time.
- Population Growth: It is the growth rate seen in a population over time.
- Natality: It is the rate of reproduction or birth rate per unit time.

E) Mortality: It is the rate of deaths per unit time. Increased mortality shows a decline in population.

3. The following diagrams are the age pyramids of different populations. Comment on the status of these populations.

Solution:

The base is the pre-reproductive population. The mid part of the pyramid is the reproductive population and the top is the post-reproductive population. Figure 'A' is a pyramid-shaped figure. This structure has a larger base than the mid and the top.

Status: This shape indicates the population would grow rapidly.

Figure 'B' is an inverted bell-shaped pyramid. In this, both the pre-reproductive and reproductive population is the same.

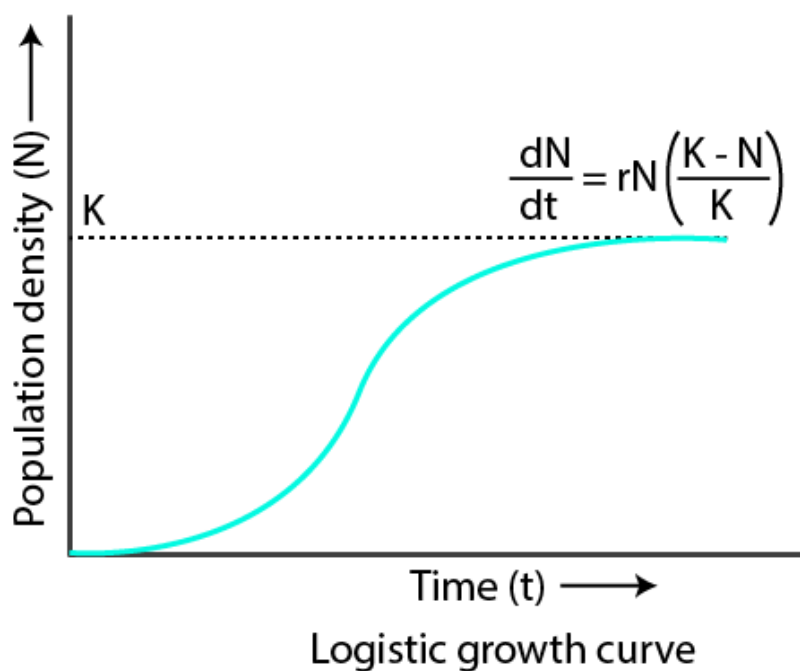
Status: This shape indicates the population is stable.

Figure 'C' is an urn-shaped pyramid. The pre-reproductive and reproductive population is lesser than the post-reproductive population.

Figure 'D' is an inverted bell-shaped pyramid. In this, both the pre-reproductive and reproductive population is the same.

Status: This shape indicates the population is stable.

4. Comment on the growth curve given below.



Solution:

The above graph shows a population growing in a habitat having limited resources. The graph shows an initial lag phase. After that, an increase in population takes place known as acceleration following which deceleration takes place and at last asymptote occurs. A sigmoid curve plot is formed when the population reaches carrying capacity. This is called Verhulst-Pearl logistic growth. This is represented by an equation: $\frac{dN}{dT} = rN \left(\frac{K-N}{K} \right)$

$\frac{dN}{dT} = rN(1-N/K)$

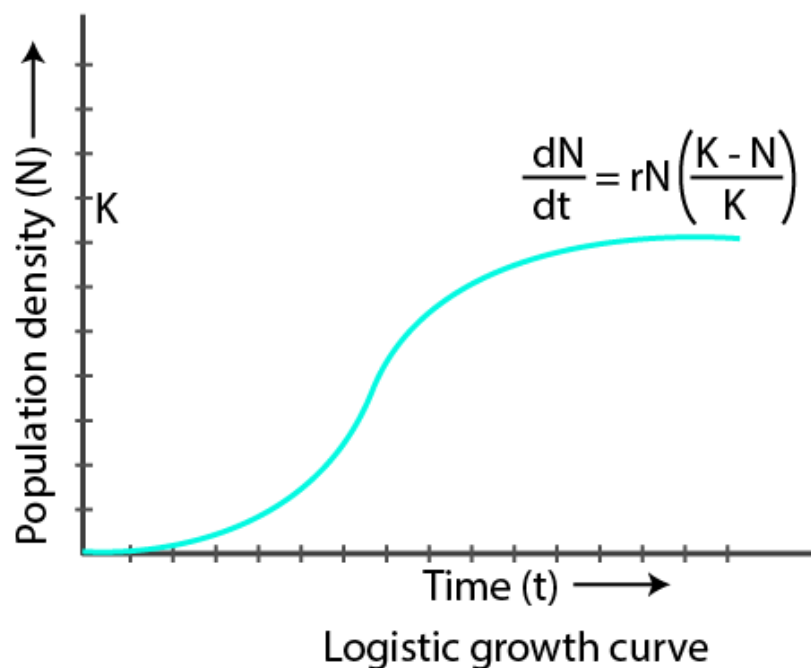
Here, $(1-N/K)$ is environmental resistance.

5. A population of *Paramecium caudatum* was grown in a culture medium. After 5 days the culture medium became overcrowded with *Paramecium* and had depleted nutrients. What will happen to the population and what type of growth curve will the population attain? Draw the growth curve.

Solution:

Sigmoid type of growth curve would be obtained. It shows a population growing in a habitat having limited resources.

The graph obtained is shown below:



The graph initially shows the lag phase. Due to acceleration, a sudden increase has taken place. After that it is followed by deceleration as the available nutrients got depleted because of excessive usage and growth of *paramecium* stops. At last, asymptote occurs.

6. Discuss the various types of positive interactions between species.

Solution:

POSITIVE POPULATION INTERACTIONS		
Species A	Species B	Nature of interaction
+	+	Mutualism
+	0	Commensalism

7. In an aquarium, two herbivorous species of fish are living together and feeding on phytoplankton. As per the Gause's Principle, one of the species is to be eliminated in due course of time, but both are surviving well in the aquarium. Give possible reasons.

Solution:

According to Gause's principle, one of the species is to be eliminated, i.e., no two species can live in the

same niche and hence one of them need to be eliminated. But in the given scenario two herbivorous species are living in the same niche and feeding on phytoplankton may be due to sufficient availability of phytoplanktons.

8. While living in and on the host species, the animal parasite has evolved certain adaptations. Describe these adaptations with examples.

Solution:

The loss of unnecessary sense organs for example lice, mites and fleas don't have wings, Presence of adhesive organs or suckers to cling on to the host in tapeworms and leeches. Loss of digestive system i.e., tapeworm. High reproductive capacity i.e., roundworm produces large progeny.

9. Do you agree that regional and local variations exist within each biome? Substantiate your answer with suitable example.

Solution:

Yes, regional and local variations exist within each biome. A biome is large communities of the world. The main biome of the world does not show the boundary of any country. Regional and local variations lead to the formation of a wide variety of habitats. On earth, life exists even in extreme and harsh habitats – scorching Rajasthan desert, perpetually rain-soaked Meghalaya forest, deep ocean trenches, torrential streams, permafrost Polar Regions, high mountain tops, boiling thermal springs and stinking compost pits, etc.

10. Which element is responsible for causing soil salinity? At what concentration does the soil become saline?

Solution:

The elements responsible for causing soil salinity are Na^+ , K^+ , Ca^{2+} , Mg^{2+} and Cl^- .

Soil salinity is the salt content in the soil, which is caused by improper irrigation. Causes of Soil Salinity are improper irrigation and human activities like fertilizing crop.

11. Does light factor affect the distribution of organisms? Write a brief note giving suitable examples of either plants or animals.

Solution:

Yes, light factor affects the distribution of organisms. Sunlight is an important factor for the plants for their photosynthesis. For example, many species of small plants (herbs and shrubs) growing in forests are adapted to photosynthesize optimally under very low light conditions so they will be seen distributed in shady areas under tall, canopied trees. The small plants in the forests are usually overshadowed by tall, canopied trees.

12. Give one example for each of the following:

- i. Eurythermal plant species _____
- ii. A hot water spring organism _____
- iii. An organism seen in deep ocean trenches _____
- iv. An organism seen in compost pit _____
- v. A parasitic angiosperm _____
- vi. A stenothermal plant species _____
- vii. Soil organism _____

- viii. A benthic animal _____
ix. Antifreeze compound seen in antarctic fish _____
x. An organism which can conform _____

Solution:

- i. Eurythermal plant species – Mango, red algae, acacia
ii. A hot water spring organism – *Thermus aquaticus*, Archaeobacteria
iii. An organism seen in deep ocean trenches – Jelly fishes, Sea cucumbers
iv. An organism seen in compost pit – Earthworm, fungi, bacteria
v. A parasitic angiosperm - *Cuscuta reflexa*
vi. A stenothermal plant species – Conifers, *Cocos nucifera*
vii. Soil organism – Bacteria, Earthworm
viii. A benthic animal – Crabs, sponges, Octopus
ix. Antifreeze compound seen in antarctic fish – Salt content, antifreeze glycoproteins or AFGPs
x. An organism which can conform – Frog