CBSE 12th Biology

Chapter - 11 Organisms And Populations

Competency-Based Questions 2024-25

Q.1 The larvae of insects such as the African midge inhabit temporary pools in hollows of rocks when water evaporates in their arid environment. These larvae revive when immersed in water even after a few years. Which response to abiotic stress does the statement depict?

A. regulation
B. migration
C. suspension
D. conformation

Answer. C. suspension

Q.2 Trees in some regions have very thin barks, broad leaves placed at different angles to allow them to capture adequate sunlight and leaves with pointed tips that allow water to run off easily. In which biome are such trees likely to be found?

A. arctic
B. desert
C. coastal
D. rainforests

Answer. D. rainforests

Q.3 Two statements are given below - one labelled Assertion (A) and the other labelled Reasoning (R).

Assertion (A): Only stenohaline fish can survive in freshwater.

Reasoning (R): Stenohaline fish can tolerate a narrow range of salinity. Which of the following is correct?

A. Both A and R are true, and R is a correct explanation of A.
B. Both A and R are true, but R is not a correct explanation of A.

C. A is true, but R is false.
D. A is false, but R is true.

Answer. D. A is false, but R is true.

Q.4 The Atlantic salmon is a fish that can tolerate a salinity of 0 to 33 ppt (parts per thousand).

Which of the following is it likely to be classified as and why?

A. Stenohaline, because it can survive only in freshwater.
B. Euryhaline, because it can survive only in marine water.
C. Euryhaline, because it can survive major variation in salt concentration.
D. Stenohaline, because it can survive only a narrow variation in salt concentration.

Answer. C. Euryhaline, because it can survive major variation in salt concentration.

Q.5 Every year, millions of monarch butterflies fly from the United States and Canada to Mexico to escape the cold weather.

Which response to abiotic stress does the statement depict?

A. Migration
B. Regulation
C. Suspension
D. Conformation

Answer. A. Migration

Q.6 Tilapia is a fish found in a variety of freshwater environments and is capable of adjusting its internal salt concentrations to match the salinity of the water. Which response to abiotic stress does the statement depict?

A. Migration
B. Regulation
C. Suspension
D. Conformation

Answer. D. Conformation

Q.7 The population of sparrows inhabiting a garden decreased dramatically. It was found that the mortality was equal to natality for the given population.

Which of the following is TRUE for the population of sparrows?

A. The number of emigrants was equal to immigrants.
B. The number of emigrants was less than immigrants.
C. The number of emigrants was more than immigrants.
D. The population of sparrows was unaffected by emigrants and immigrants.

Answer. C. The number of emigrants was more than immigrants.

Q.8 The black walnut plant secretes juglone, a chemical substance that destroys other plants like pepper growing within its root zone.

Which type of population interaction does the above statement represent?

A. Predation
B. Competition
C. Mutualism
D. Amensalism

Answer. D. Amensalism

Q.9 A patch of grassland was inhabited by 100 goats in August 2022. Between August 2022 and December 2022, it was found that the average natality was 10, average mortality 8, average immigration 5, and average emigration 3. At the end of December 2022,

(a) what was the population density of goats in the same patch of grassland?
(b) was there a net increase or net decrease in the population of goats?
(c) what was the value by which there was a net increase or decrease in (b)?

Answer. (a) 0.5 mark each for writing the formula and the correct answer

Population density is calculated by the following formula:

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

$= 100 + [(10+5)-(8+3)]$

$= 104$

(b) net increase

(c) 4

Q.10 Mistletoe is a plant that grows on the branches of oak trees. It takes nutrients from the oak tree and can weaken or kill it over time.

(a) Identify the host and the parasite.
(b) Give one point of similarity and difference between the above scenario and predation.

Answer. (a) 0.5 mark for each of the following: - Host - oak tree - Parasite - mistletoe (b) 1 mark for any one of the following similarities: - The parasite and predator benefit from the relationship. - The host and prey are harmed in the relationship. - One species always benefits and the other is always harmed. 1 mark for any one of the following differences: - The parasite lives inside or on the host whereas the predator does not. - The parasite may or may not kill the host but the predator always kills the host. [Accept any other relevant

Answer. (a) 0.5 mark for each of the following:

- Host - oak tree
- Parasite - mistletoe

(b) 1 mark for any one of the following similarities:

- The parasite and predator benefit from the relationship.
- The host and prey are harmed in the relationship.
- One species always benefits and the other is always harmed.

1 mark for any one of the following differences:

- The parasite lives inside or on the host whereas the predator does not.
- The parasite may or may not kill the host but the predator always kills the host.

[Accept any other relevant answer.]

Q.11 Read the scenario below and answer the questions that follow.

In the Caribbean, there are several species of Anolis lizards that live in the same habitats and feed on similar prey. However, research has shown that when two species have

nearly identical body size and feeding habits, one species will outcompete the other for resources, leading to the exclusion of the other species.

(a) For the above example of competition to satisfy Gause's Competitive Exclusion Principle, name two conditions that MUST be met.
(b) State two ways by which the two species could co-exist in the same habitat.

Answer. (a) 0.5 mark for each of the following:

- resources are limited
- competition is between closely-related species

(b) 0.5 mark for each of the following:
- feeding at different times of the day
- feeding on different parts of the same resource

[Accept any other valid answer.]

Q.12 Read the scenario below about interference competition and answer the questions that follow. Red squirrels and gray squirrels both live in forests and compete for food and nesting sites. Red squirrels are known to be more aggressive than gray squirrels, and they will often chase gray squirrels away from food sources and nesting sites.

(a) The resources present in the habitat above must be limiting. Is this statement true or false? Justify your answer.
(b) Which species' r-value is likely to drop and why?

Answer. (a) 0.5 mark for each of the following:

- Statement is FALSE.

- Reason - The feeding efficiency of one species could reduce due to the interfering and inhibitory presence of the other species, even if resources are abundant.

(b) 0.5 mark for each of the following:

- gray squirrel
- Because of the red squirrels aggression, the gray squirrels have limited access to the resources.

Q.13 Mark the following statements as TRUE or FALSE and give a reason to support your answer.

(a) Competition happens only between closely-related species.
(b) Competition always leads to the elimination of one species.
(c) Two species compete only when the resources are limited.

Answer. (a) 0.5 mark for each of the following:

- False
- Unrelated species can also compete for the same resource.

(b) 0.5 mark for each of the following:
- False
- Some species in a competitive relationship might co-exist by resource partitioning.

[Accept any other valid reason.]

(c) 0.5 mark for each of the following:

- False
- Species can also compete when resources are abundant where one species interferes with the feeding patterns of another species.

Q.14 Which one of the following examples can be classified as mutualism? Justify.

(i) Male fireflies use flashing lights to attract females. However, some females will mimic the flash pattern of another species to attract and consume males of that species.

(ii) The pitcher plant produces a scent that mimics the scent of ripe fruit, which attracts insects that feed on fruit. When the insects land on the plant, they slip on the slippery surface of the pitcher and fall into the digestive fluid inside.

(iii) The night-blooming flowers of senita cacti are visited by tiny senita moths that transfer pollen. The female moth lays eggs on a flower petal and eventually, the larva feeds on the seeds and fruit tissue.

Answer. 1 mark each for identifying the correct example and giving reason.

- (iii)
- Reason: Only in (iii), both species are being benefitted.

OR

In (i) and (ii), one species is being killed.

[Accept any other valid reason.]

Q.15 A forest can accommodate a maximum of 500 deer (i.e., its carrying capacity). If the initial population size is 100 deer and the maximum per capita growth rate is 0.05 per year, calculate the rate of change of the population size of deer for given time period.

Answer. Possible complete answer:

$$\frac{dN}{dT} = rN\left(\frac{K-N}{K}\right)$$

$$= 0.05 \times 100\left(\frac{500-100}{500}\right)$$

= 0.05 × 100 × 0.8
= 4 deer per year
0.5 marks each for the following:
- writing the correct formula
- substitution
- calculation
- correct answer