

Get Ready to Crack CSIR-NET 2021 (Most Important Questions on Ecology)



1. Predators can influence the structure of a community because their removal from the community causes a huge impact in the composition and structure of the rest of the community. What are the predators called because of this

- A) Dominant species
- B) Umbrella species
- C) Keystone species
- D) Flagship species

2. Group I list relationships that can exist between two organisms. Their description is given in group II.

Group I

- P. Amensalism
- Q. Mutualism
- R. Neutralism
- S. Commensalism

Group II

- 1. Two populations occur together but do not interact
- 2. A symbiotic association that benefits both species
- 3. Beneficial to only one species but not to the other
- 4. One population is inhibited other is unaffected

- A) P-4, Q- 3, R- 1, S-2
- B) P-2, Q-1, R-3, S-4
- C) P-4,Q-2,R-1,S-3
- D) P-3, Q-4,R-2, S-1

3. Feature by an individual that lowers the fitness of donor for the benefit of the population or species at no evolutionary cost to donor and behaviour by an individual that increases the fitness of recipients is termed as

- A. Reciprocity and Altruism
- B. Symbiosis and Predation
- C. Parasitism and amensalism
- D. Nepotism and Kin selection

4. Characteristics of the r-selected population. Which of the following is the incorrect statement

- A) High rate of per capita population growth
- B) Poor competitive ability
- C) Shorter life span
- D) Body size large

5. . Match the following using the code given below the lists.

P. Bergman's law 1. Temperature affects the size of warm-blooded animals in the northern and colder parts of their range.

Q. Gloger's rule 2. Temperature influences the morphology of certain fishes and some relation with the number of vertebrae

R. Jordan's rule 3. Temperature affects the extremities of animals living in the northern and colder parts of their range have reduced.

S. Allen's rule 4. Temperature affects the melanin production of animals living in the warm and moist climate

- A) P-2, Q-3, R-1, S-1
- B) P-1, Q-3, R-2, S-4
- C) P-3, Q-4, R-1, S-2

D) P-1,Q-4, R-2, S-3

6. If a plant has a fresh weight of 150 g, a dry weight of 50 g, and a turgid weight of 120 g what is its relative water content?

- A.200g
- B.100g
- C.142.8g
- D.62.5g

7. A student decides to conduct a mark-recapture experiment to estimate the population size of largemouth bass in a small pond near her home. In the first catch, she marked 50 individuals with coloured tags. Two weeks later she captured 40 individuals, of which 5 were marked. What is the estimated size of the population based on these data?

- A) 400
- B) 600
- C) 550
- D) 700

8. In Lotka-Volterra competition models, if $K_2/\beta < K_1$ and $K_1/\alpha > K_2$, then

- A) N1 is eliminated
- B) N2 is eliminated
- C) Either species may be eliminated depending on starting conditions
- D) Both species coexist

9. Type I survivorship curve is characteristic of species with the rapid increase in mortality in old age. This type of curve is

- A) Typical for humans and mammals
- B) Typical for all species of birds
- C) Typical invertebrates that produce a large number of offspring
- D) Typical amphibians

10. . The number of trophic levels in an ecosystem's food chain is restricted to 3-4.

- A. Quantity of energy decrease from lower to higher trophic levels
- B. Quantity of energy increases from lower to higher trophic levels.
- C. Quantity of energy decreases from higher to lower trophic levels.
- D. Flow of nutrients is unidirectional.

Answer:

1. A
2. C
3. A
4. D
5. D
6. C
7. A
8. A
9. A
10. A

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Solution

1. A species having a huge effect on a community out of all proportion to its biomass is called keystone species. The term was introduced by Robert Paine to describe the importance of the predatory starfish, *Pisaster*.
2. Facilitation describes species interactions that result in benefits to at least one of the species involved, and often to both species. Facilitation can be split into two categories. The first one is commensalism, The benefits one species and leaves the other unaffected is called commensalism. The second one is the interaction, or rather lack of interaction, termed when two species occur together but do not interact in any measurable way.
3. An altruistic trait is a feature that reduces the fitness of an individual that bears it for the benefit of the population or species. The most extreme form of altruism is the evolution of sterile castes in social insects, in which the vast majority of females, known as workers, rarely reproduce themselves but instead help one reproductive female (the queen) to raise offspring, a phenomenon called eusociality. altruism is known to exist between unrelated individuals is called reciprocity
4. *r* Species that have a high rate of per capita population growth, *r*, but poor competitive ability . *r*-selected species produce many young and have short life cycles. *r* Species have smaller body size.
5. A number of patterns relate changes in animal body size and extremity length over different geographic areas to different geographic areas to different temperature regimes. The best-known patterns are Bergmann's rule and Allen's rule. Bergmann noted that among closely related mammals or birds, the largest species occurred at higher latitudes, where it is colder. This is known as Bergmann's rule. Allen's rule states that among closely related endothermic (warm-blooded) vertebrates, those living in colder environments tend to have shorter appendages than those living in warmer environments. A classic example is the ear size of hares and foxes.
6. Plant cell walls restrict the extent to which cells can expand, hence the pressure on the cell wall increases as more water enters the cell. Property is known as relative water content, RWC is a measure of turgidity and hence the water content of plants. To estimate RWC, three measurements are needed: fresh weight, turgid weight, and dry weight.

These measurements are used to calculate RWC according to the equation:

$$RWC = \frac{(\text{fresh weight} - \text{dry weight})}{(\text{turgid weight} - \text{dry weight})} \times 100$$

$$= \frac{150 - 50}{70} = 100/70$$

$$= 142.8g$$

7.

$$N = \frac{50 \times 40}{5} = \frac{2000}{5} = 400$$

$$N = \frac{\text{Number of marked individuals in first catch} \times \text{Total number of second catch}}{\text{Number of marked recaptures in second catch}}$$

Sometimes population biologists will capture animals and then tag and release them. The rationale behind this is that after the tagged animals are released, they mix freely with unmarked individuals and within a short time are randomly mixed within the population. The population is resampled and the numbers of marked and unmarked individuals are recorded. We assume that the ratio of marked to unmarked individuals in the second sample is the same as the ratio of marked individuals in the first sample to estimate the total population size.

8. The growth rate of populations of two species growing independently can be described using logistic growth equations. As before, r is the per capita rate of population growth, N is the population size, and K is the carrying capacity. Such relationships can be expressed graphically. In the absence of species 2, the population growth of N_1 continues to the carrying capacity of the environment K_1 . Alternatively, the whole environment may be filled with N_2 individuals, and no growth of N_1 is possible because K_2 has been reached. In this case, the equivalent number of individuals of K_2 would be K_1/d . These are the two extremes marked on the axes. Between these two extremes are many combinations of N_2 and N_1 at which no further growth of N_1 is possible.

9. Survivorship curves plot the number of surviving individuals to a particular age. Type I survivorship highly convex type curve is characteristic of species in which population mortality is low until near end of life span eg: Man, deer, sheep etc.

10. Energy is passed up a food chain or web from lower to higher trophic levels. However, generally, only about 10 percent of the energy at one level is available to the next level. This loss of energy explains why there are rarely more than four trophic levels in a food chain or web

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