

※ 考生請注意：本試題不可使用計算機。請於答案卷(卡)作答，於本試題紙上作答者，不予計分。

1. Predict what effects global warming might have on animal populations in the ocean and on land. Explain the physiological principles and mechanisms that your predictions based on. (20%)
2. Neuston forms a very unusual assemblage of aquatic organisms (泛指生活在水表面或水中接近水面層的動物). Use two species from two different phyla as examples to describe the ecology and biology of the neuston. Concentrate on ecological and physiological adaptations of each species. (10%)
3. The Shannon diversity index (H') has been widely used to characterize species diversity in a community. It can be calculated as: $H' = -\sum P_i \ln(P_i)$, $i = 1, \dots, R$; where R is number of species in the community and P_i is the proportion of individuals of the i th species. Please explain the rationale of this index. (7%)
If you calculated the Shannon diversity index for a bird community and obtained a value of 2.5, how would you interpret this information? (7%)
4. There is a long history in ecology to relate disturbances to species richness. Joseph Connell (1978) proposed "Intermediate Disturbance Hypothesis (IDH)" and suggested that the highest species richness would occur at intermediate frequencies of disturbances, permitting both colonists and competitors to coexist. Please explain the original idea of IDH. (7%)
However, current review did not find consistent support for the hypothesis. What are other possible factors involved in the diversity-disturbance relationships? (7%)
If you are interested in testing this hypothesis, how would you design your experiment? (7%)
5. Distinguish logistic and exponential population growth models by their model parameters, and major assumptions. (6%)
6. Distinguish density dependent and density independent population regulation factors, and compare how each may affect population dynamics. (6%)
7. Discuss why animals may aggregate to form large colonies and overnight at some same sites together. Think of all possible explanations that occur to you, and distinguish them in terms of cost and benefits to animals. (10%)
8. Describe, with illustrations, the possible relationships of diversity and stability of communities. (8%)
9. Describe the differences between r - and K -selected species, and in what types of environmental characteristics they may be evolved. (5%)