

國立中山大學八十八學年度預博士班招生考試試題
科目：生物科學（生物科學系博士班）

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每人限選四題作答，每題 25 分。（違反規定超選者，以最低分數的四題計分）

生物科學所 博士班 生物科學 試題

1. Define "homeostasis". Explain how do the nervous system and the endocrine system interact to maintain the internal homeostasis of the organism.
2. The following measurements were made on a person at 1 atm barometric pressure
PaCO₂ = 38 mm Hg; (partial pressure of CO₂ in the arterial blood)
PaO₂ = 104 mm Hg; (partial pressure of O₂ in the arterial blood)
FeCO₂ = 0.04; (CO₂ fractions in the mixed expiratory gases)
pHa = 7.52 (pH value of arterial blood)
[HCO₃]⁻ = 30.2 mEq/L (calculated bicarbonate concentration in arterial blood)
breathing frequency = 20 breaths/min
tidal volume = 500 ml

Questions:
(a) What is the minute ventilation value?
(b) What is the alveolar ventilation?
(c) Your comments on this person's blood gas and acid-base status.
(d) If this person halves his respiratory frequency while maintaining the tidal volume at 500 ml, what would his alveolar ventilation be? How would his acid-base status be at this situation?
3. Describe the structure of brain and spinal cord in mammal.
4. Discuss the meaning of the phrase "cells are steady-state system."
5. In a most recent report, the National Institute of Health of USA said that the Human Genome Project will be completed by the year 2002. Describe the Human Genome Project and discuss the ethical questions the results of this project may raise.
6. Contrast in detail similarities and differences among prokaryotic cells, animal cells, and plant cells.
7. What is a species?
8. Describe the kind and the distribution of Taiwan major terrestrial ecosystems (biomes, e. g. tundra, desert....).
9. Give an example showing how MacArthur's theory of island biogeography was used in community ecology research.