

國立臺灣師範大學 103 學年度碩士班招生考試試題

科目：普通生物學

適用系所：生命科學系、科學教育研究所

注意：1.本試題共 4 頁，請依序在答案卷上作答，並標明題號，不必抄題。2.答案必須寫在指定作答區內，否則不予計分。

一、解釋名詞 (第 1 到 6 題任選 3 題作答，每題 3 分，共 9 分；第 7 到 12 題全數作答，每題 2 分，共 12 分；本大題共 21 分)

1. Autocrine
2. Cephalization
3. Negative feedback
4. Circulation
5. Ram ventilation.
6. Counter current
7. Neutral theory (in evolution)
8. Neutral theory (in ecology)
9. Metapopulation
10. Hardy-Weinberg principle
11. Niche conservatism
12. Double fertilization

二、單選題 (每題 2 分，共 36 分)

1. Which of the following items is the first cell seen by Robert Hooke using a microscope?

- (A) cork cell (B) sperm cell (C) protist cell
(D) bacterial cell (E) cell from an insect's eye

2. If a cell membrane is pierced with a very fine needle, what will the cell happen subsequently?

- (A) explode (B) seal itself (C) collapse
(D) divide itself (E) absorb fluid from the outside and grow

3. Which of the following terms best describes the role of certain metal ions and coenzymes in metabolic processes?

- (A) reactants (B) cofactors (C) intermediates
(D) products (E) catalysts

4. Which of following items describes the process that organisms derive their chemical energy from chemosynthesis?

- (A) parasitic (B) heterotrophic (C) saprophytic
(D) autotrophic (E) chemoautotrophic

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5. Which shape is the graph of a population that is growing exponentially in the absence of limiting factors?
- (A) S-shaped (B) J-shaped (C) V-shaped
(D) U-shaped (E) N-shaped
6. At the higher trophic levels, which is biological magnification refers to?
- (A) larger size of animals
(B) greater number of organisms
(C) the greater number of species
(D) accumulation of toxic pollutants in animals
7. Which of the following statements is **NOT** true about the reproductive behavior of voles?
- (A) Oxytocin induces monogamy in female prairie voles
(B) Monogamous species have fewer oxytocin receptors than promiscuous species
(C) ADH receptors in the brain play a role in monogamy
(D) Mountain voles are more promiscuous than prairie voles
(E) Male meadow voles are not monogamous
8. Which of the following is the nutrient recycling in an ecosystem begins with?
- (A) producers
(B) lower level consumers
(C) upper level consumers
(D) decomposers
(E) detritivores
9. The movement of chloroplasts in plant cells is mainly regulated by
- (A) red light. (B) blue light. (C) gravity.
(D) photoperiod. (E) turgor pressure.
10. Abscisic acid is a plant hormone that participates in water conservation by all of the following means **EXCEPT**
- (A) reducing the flow of potassium and other substances out of the guard cells.
(B) reducing the movement of water out of the guard cells.
(C) causing the guard cells to become hypotonic in relation to their neighboring cells.
(D) causing the decrease of carbon dioxide in the guard cells.

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(E) causing the decrease of calcium in the guard cells.

11. The largest cells in the vascular bundles are

- (A) vessel cells. (B) sclereids. (C) sieve tube cells.
(D) parenchyma. (E) companion cells.

12. A gametophyte is a _____ plant body that grows by _____ from a _____.

- (A) diploid; mitosis; zygote. (B) haploid; mitosis; spore. (C) diploid; meiosis; zygote.
(D) haploid; meiosis; zygote. (E) haploid; meiosis; spore.

13. The similarity of traits from one generation to another is fundamentally the result of

- (A) mitosis. (B) meiosis. (C) semiconservative replication.
(D) sexual reproduction. (E) gene compatibility.

14. Ricin is toxic because it inactivates the function of

- (A) DNA. (B) mRNA. (C) tRNA.
(D) ribosomes. (E) nerve cells.

15. Which of the following enzyme is not a protein or a protein complex?

- (A) Polymerase. (B) Topoisomerase. (C) Helicase.
(D) Ligase. (E) Ribozyme.

16. Regarding to gene variation, which of the following statements is **FALSE**?

- (A) Independent assortment of homologous chromosomes during meiosis increases variation.
(B) Abnormal number or structure of chromosomes may influence the course of evolution.
(C) Crossing over tends to reduce the frequency that two linked genes are inherited together.
(D) Crossing over leads to variation.
(E) Two genes on a chromosome are closer, they have greater chance to cross over.

17. Hutchinson-Gilford progeria is a human genetic disorder causing early aging, it is due to

- (A) dominant mutation on X chromosome.
(B) dominant mutation on Y chromosome.
(C) dominant mutation on autosomal chromosome.
(D) recessive mutation on autosomal chromosome.
(E) recessive mutation on X chromosome.

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18. A gene might encode different protein isoforms. Which of the following process rarely results in different isoforms?

- (A) Riboswitch. (B) Alternative splicing. (C) Alternative polyadenylation.
(D) Alternative translation initiation. (E) Alternative transcription initiation.

三、配對題 (每題 1 分，共 5 分)

在答案卷上直接標示題號及相對應之答案英文代碼。列舉之答案可能不符合任一題目。

Some vascular plants have modified stem structures that function in storage, photosynthesis, asexual reproduction or protection. Match the plants listed in “Answers” column to the following specialized stems listed in “Questions” column.

Questions

1. Bulbs
2. Cladodes
3. Corms
4. Rhizomes
5. Stolons

Answers

- A. Cactus
- B. Iris
- C. Onion
- D. Potato
- E. Strawberry
- F. Taro

四、問答題 (共 38 分)

1. 試以人體體溫調節為例，說明恆定狀態(homeostasis)之維持。(8 分)
2. 請列舉四項，鈣離子在動物體內參與的生理反應或功能(8 分)
3. 請說明聖嬰現象形成的原因，及其如何影響當地海洋的漁獲量(5 分)
4. 請舉例說明擬態與偽裝在生態上的不同意義(4 分)
5. Compare and contrast the strategies of “single large” vs. “several small” for animal conservation. (4 分)
6. Compare and contrast the speciation mechanisms of prezygotic isolation vs. postzygotic isolation. (4 分)
7. Which organelles of eukaryotic cells probably descended from endosymbiotic bacteria? (2 分) Is there any evidence to support the endosymbiotic hypothesis? (3 分)