

※ 注意：請於答案卷上「非選擇題作答區」內依序作答，並應註明作答之大題及其題號。

I. 簡答題 (共 48 分)

1. Please describe the difference between apoplastic transportation and symplastic transportation in roots. (10 分)
2. What are the different characteristics between primary cell wall and secondary cell wall? (8 分)
3. Different kinds of blotting methods were developed to investigate the mechanism of numerous biological processes. Please describe Southern blotting, Northern Blotting, and Western blotting. (8 分)
4. RNA interference (RNAi) has been used for disease therapy, plant breeding, developmental process study...etc. Please describe the mechanism of RNAi. (8 分)
5. Please list the functions of cell membrane proteins. (8 分)
6. What are the three major steps of cell signaling? (6 分)

II. 解釋名詞 (每題 4 分；共 24 分)

1. immunological memory
2. leptin
3. species diversity (of a community)
4. operant conditioning
5. carrying capacity (in ecology)
6. cladistics

見背面

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III. 選出一個最適當的答案選項，並說明你選擇的理由。(每題 4 分；共 28 分)

1. Which of following statements about digestive function is incorrect?

- A) Secretin released from duodenum potently stimulates the secretion of pancreatic enzymes.
- B) Bile contains  $\text{HCO}_3^-$  for neutralization of acidic gastric juice.
- C) CCK stimulates the contraction of gallbladder, allowing more bile to enter the duodenum.
- D) Gastrin stimulates the secretion of pepsinogen from the chief cells.
- E) Secretin inhibits the secretion of gastric juice.

2. The chemoreceptors in the medulla are stimulated by

- A) decreased arterial pH.
- B) increased CSF pH.
- C) decreased arterial  $\text{PO}_2$ .
- D) increased arterial  $\text{PCO}_2$ .
- E) increased lactic acid in blood.

3. Suppose that all the calcium could be removed from the extracellular fluid surrounding a neuron (instead of other divalent cation that can't pass the membrane). Such removal would inhibit the ability of a neuron to

- A) produce action potentials.
- B) release neurotransmitters.
- C) produce synaptic potentials.
- D) degrade neurotransmitters.
- E) generate a resting membrane potential.

4. When a healthy subject stands up abruptly after lying down, the veins in the lower limbs become distended and accumulate blood. Which of the following would be not likely to happen immediately?

- A) Arterial blood pressure will decrease.
- B) Heart rate will increase.
- C) Afferent activities of arterial baroreceptors will increase.
- D) Stroke volume will decrease.
- E) Sympathetic activity to veins will increase.

5. A skeletal muscle deprived of adequate ATP supplies will

- A) immediately relax.
- B) release all actin-myosin bonds.
- C) contract sustainedly.
- D) enter a state where actin and myosin are unable to separate.
- E) fire many more action potentials than usual and enter a state of "rigor."

6 How does a steroid hormone cause different effects in different cells?

- A) by binding to different receptors on cell membrane
- B) by activating different second messengers
- C) by acting on different organelles
- D) by activating different genes
- E) by activating different enzymes

7. In comparing the kidneys of marine bony fish and freshwater fish which of the following is not true?

- A) Marine bony fish drink greater quantities of water.
- B) The flow of the filtrate is faster in marine bony fish.
- C) Freshwater fish have larger glomeruli.
- D) Marine bony fish excrete many of the divalent cations through the urine.
- E) The urine is less concentrated in freshwater fish.