

注意：考試開始鈴響前，不得翻閱試題，
並不得書寫、畫記、作答。

國立清華大學 110 學年度碩士班考試入學試題

系所班組別：生命科學院

丁組(醫學生物科技學程)

科目代碼：0705

考試科目：細胞生物學

—作答注意事項—

1. 請核對答案卷(卡)上之准考證號、科目名稱是否正確。
2. 考試開始後，請於作答前先翻閱整份試題，是否有污損或試題印刷不清，得舉手請監試人員處理，但不得要求解釋題意。
3. 考生限在答案卷上標記「由此開始作答」區內作答，且不可書寫姓名、准考證號或與作答無關之其他文字或符號。
4. 答案卷用盡不得要求加頁。
5. 答案卷可用任何書寫工具作答，惟為方便閱卷辨識，請儘量使用藍色或黑色書寫；答案卡限用 2B 鉛筆畫記；如畫記不清(含未依範例畫記)致光學閱讀機無法辨識答案者，其後果一律由考生自行負責。
6. 其他應考規則、違規處理及扣分方式，請自行詳閱准考證明上「國立清華大學試場規則及違規處理辦法」，無法因本試題封面作答注意事項中未列明而稱未知悉。

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系所班組別：生命科學院甲組、丁組

考試科目（代碼）：細胞生物學(0405、0705)

共 4 頁，第 1 頁 *請在【答案卷】作答

一、多選題(每題 5 分，共 50 分；答對一個選項得 1 分，答錯一個選項扣 1 分，倒扣至此題 0 分為止；未作答，不給分亦不扣分) 答案寫在答案卷上

1. Which of the following techniques are required to prepare biological samples for electron microscope
(A) Immunohistochemistry
(B) Immunogold labeling
(C) Immunoprecipitation
(D) Ultrathin sectioning
(E) Negative staining
2. Which of the followings are part of the endomembrane system?
(A) Lysosome
(B) Nuclear envelope
(C) Plasma membrane
(D) Central vacuole
(E) Endoplasmic reticulum
3. In the fractionation of homogenized cells using centrifugation, the primary factor that determines whether a specific cellular component ends up in the supernatant or the pellet are the?
(A) Relative solubility of the component
(B) Size and weight of the cellular component
(C) Percentage of carbohydrates in the component
(D) Presence or absence of lipids in the component
(E) Density of the cellular component
4. All of the following are part of a prokaryotic cell **EXCEPT**?
(A) Cell wall
(B) Mitochondria
(C) Plasma membrane
(D) Endoplasmic reticulum
(E) Ribosomes

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共 4 頁，第 2 頁 *請在【答案卷】作答

5. What is the function of the nuclear pore complex found in eukaryotes?
- (A) It regulates the movement of proteins into and out of the nucleus
 - (B) It synthesizes the proteins required to copy DNA and make mRNA
 - (C) It selectively transports molecules out of the nucleus, but prevents all inbound molecules from entering the nucleus
 - (D) It assembles ribosomes from raw materials that are synthesized in the nucleus
 - (E) It regulates the movement of RNAs out of the nucleus
6. Which of the following cell types have extensive area of endoplasmic reticulum?
- (A) Neurons that transmit nerve impulse
 - (B) Muscle cells that contract to move bones
 - (C) Pancreatic acinar cells that secrete large amounts of digestive enzymes
 - (D) Plasma cells that secrete antibodies
 - (E) Epithelial cells on the surface of the skin
7. Which of the following are **TRUE** for both chloroplasts and mitochondria?
- (A) have their own DNA
 - (B) have double membrane structure
 - (C) are part of the endomembrane system
 - (D) are capable of reproducing themselves
 - (E) The endosymbiont theory supports their evolutionary origins
8. Which of the following contain the “9 + 2” arrangement of microtubules, consisting of nine doublets of microtubules surrounding a pair of single microtubules?
- (A) Flagella and
 - (B) Primary (nonmotile) cilia
 - (C) Motile cilia
 - (D) Centrioles
 - (E) Basal bodies

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共 4 頁，第 3 頁 *請在【答案卷】作答

9. The extracellular matrix is thought to participate in the regulation of animal cell behavior by communicating information from the outside to the inside of the cell via which of the following?

- (A) Gap junctions
- (B) Integrins
- (C) Desmosomes
- (D) Microfilaments
- (E) Tight junctions

10. Cell membranes are asymmetrical. Which of the following statements are the most likely explanations for the membrane's asymmetrical nature?

- (A) Since the cell membrane forms a border between one cell and another in tightly packed tissues such as epithelium, the membrane must be asymmetrical.
- (B) Since cell membranes communicate signals from one organism to another, the cell membranes must be asymmetrical.
- (C) The two sides of a cell membrane face different environments and carry out different functions.
- (D) Proteins only function on the cytoplasmic side of the cell membrane, which results in the membrane's asymmetrical nature.
- (E) The two sides of membrane are structurally different. Different phospholipids are found in each side of the membrane.

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共 4 頁，第 4 頁 *請在【答案卷】作答

二、問答題(每題 10 分，共 50 分)

1. Explain what are (a) co-translational transport (5%) and (b) post-translational transport (5%).
2. (a) What are the differences between endocrine and paracrine signaling (5%); (b) How does the signaling by hydrophobic molecules like steroid hormones differ from signaling by peptide hormones? (5%)
3. (a) What is G protein cycle? (5%) (b) What is the role of G protein cycle in the Ran-dependent nuclear transport of proteins? (5%)
4. What are (a) “smooth” endoplasmic reticulum and “rough” endoplasmic reticulum? (5%) (b) What are their main functions in the cell? (5%)
5. (a) How carbohydrate groups of glycoprotein are added to the protein? (5%) (b) What are the main functions of this post-translational modification? (5%)