

# 國立清華大學 101 學年度碩士班考試入學試題

系所班組別：生命科學院甲組、醫學生物科技學程

考試科目（代碼）：細胞生物學(0405、0705)

共\_\_1\_\_頁，第\_\_1\_\_頁 \*請在【答案卷】作答

1. Design an experiment to show that gap junctions are present in cardiac muscles, and explain the function of these gap junctions in heart contraction. (10%)
2. If an objective lens has inscribed  $\infty/0.17$ , what does the " $\infty$ " mean? Also, what does "0.17" mean? (5%)
3. Why Taxol is an antimetabolic drug? If you add Taxol to dividing cells, what phase of mitosis will be arrested? (5%)
4. Why does collagen assembly only occur in the extracellular space? Why does collagen appear striated? (5%)
5. Describe the structure, location, and functions of gap junctions. (8%)
6. Describe the function of acetylcholinesterase and discuss its physiological significance. (8%)
7. Distinguish between voltage-regulated and chemically regulated ion channels. (9%)
8. Please briefly describe the three main classes of membrane proteins? Among them, which one can be isolated from membranes by changing the pH or ionic strength? Why? (9%)
9. If you were to remove the ER retrieval signal from protein disulfide isomerase (PDI), which is normally a soluble resident of the ER lumen, where would you expect the modified PDI to be located? Why? (7%)
10. What are the two models which depict the flow of proteins through the Golgi complex? Most exported proteins move across the Golgi apparatus within 5-10 minutes, but large proteins, like procollagen type I (PC), take about an hour. Please give the reasons for the above observation based on the two models you provide? (9%)
11. Please describe the current model for the signal mechanism of cotranslational import. (8%)
12. Please describe how G protein-linked receptor, via cAMP, can activate gene expression in the nucleus. (8%)
13. Please describe the distinct mechanisms for converting proto-oncogenes into oncogenes. (9%)