

國 立 清 華 大 學 命 題 紙

98 學年度 生命科學院、生命科學院醫學生物科技學程 系(所) 甲 組碩士班入學考試

科目 細胞生物學 科目代碼 0205、0505 共 1 頁第 1 頁 \*請在【答案卷】內作答

1. The Nobel Prize in Chemistry 2008 is awarded to Osamu Shimomura, Martin Chalfie, and Roger Tsien for their discovery and development of the green fluorescent protein, GFP. Please give an example of using GFP in studying cell biology (including experimental design and expected results). (10%)
2. Calcium is an important cellular cation. Please name a role that  $Ca^{2+}$  plays in cell biology, and design an experiment to demonstrate this role. (10%)
3. What is the most important reason that cell biologists use the confocal microscope, instead of the fluorescence microscope? (5%)
4. Specific structural features tag proteins for transport to various intracellular and extracellular destinations. Please give an example of how a protein using a specific structural tag to reach its final destination? (8%)
5. Please describe the current model of cell membrane structure and the functions of cell membrane. (8%)
6. Cells have evolved a set of complicated pathways for addition of carbohydrates to proteins, implying that carbohydrates serve some important function, yet for the most part these functions are not known. List three functions that carbohydrates on proteins are known to serve. (9%)
7. Please describe the current model for the cotranslational import of polypeptides into the ER (8%)
8. Please describe how G protein-linked receptor, via cAMP, can activate gene expression in the nucleus (8%).
9. Please describe how mitotic Cdk-Cyclin complex (MPF) controls both G2 checkpoint and spindle assembly checkpoint (9%).
10. 請問為何細胞膜上各個離子通道(ion channel)會有不同的 Equilibrium membrane potential? (8%)
11. 有位研究生從事 patch clamp 的實驗，依你 Cell Biology 所學，你認為這位研究生到底是在量測什麼東西(溫度? 重量?)? 他為什麼要量測這些東西(即量測的數據可以知道些什麼?)? (8%)
12. 武俠小說常描述「以毒攻毒」來解毒。依你 Cell Biology 所學的 Receptor 觀念來解釋為何被毒蛇咬傷會造成神經毒性。用「以毒攻毒」法可以化解毒蛇咬傷所造成神經毒性嗎? (9%)