

國 立 清 華 大 學 命 題 紙

99 學年度生命科學院甲組及醫學生物科技學程碩士班入學考試

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) Why does treadmilling of microtubules occur? (5%)
- (2) What motor MAP is used to carry vesicles from rough ER to Golgi complex? Why? (5%)
- (3) Describe how *Listeria* (the gram-positive bacterium) co-opts the cell's normal cell adhesion and cell motility systems to invade other eukaryotic cells. (5%)
- (4) Describe an experiment to show both E-cadherin and P-cadherin on cell adhesion is homophilic interactions. (5%)
- (5) What is FRET? Briefly describe its principle. (5%)
- (6) Please describe the current model for the cotranslational import of polypeptides into the ER (8%)
- (7) Please describe how G protein-linked receptor, via cAMP, can activate gene expression in the nucleus (8%).
- (8) Please describe how mitotic Cdk-Cyclin complex (MPF) controls both G2 checkpoint and spindle assembly checkpoint (9%).
- (9) A molecule has a characteristic size and shape. Why molecular shape is crucial in biology? (5%)
- (10) As a cell grows, its plasma membrane expands. Does this involve endocytosis or exocytosis? Explain. (8%)
- (11) Imagine a new type of cells was discovered on Mars in an organism growing in benzene, a nonpolar liquid. The cell had a lipid bilayer made of phospholipids, but its structure was very different from that of our cell membrane. (12%)
 - (a) Draw what might be a possible structure for this new type of membrane. What might be characteristic features of the phospholipid head groups?
 - (b) What properties would you expect to find in membrane proteins imbedded in this membrane?
- (12) 請問 Goldman equation 與 Nernst equation 有何不同?
其不同之處對應到細胞膜的何種構造? 主要是描述何種相關特性與功能? (13%)
- (13) 談到 signal 在神經細胞內的傳導; 許多原文書裡會分別使用 spread 及 propagation 兩個字, 請問為什麼需要用這兩字來表示 signal 的傳導? 它們有何差異? (12%)