

# 國立清華大學 104 學年度碩士班考試入學試題

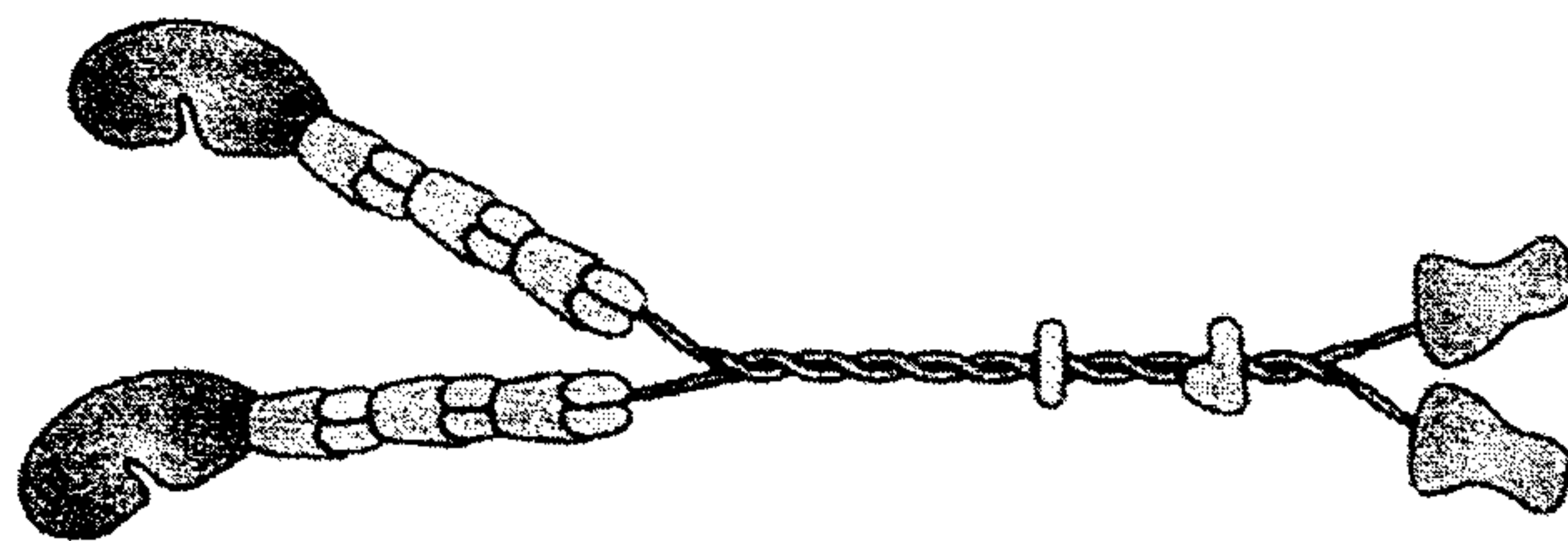
系所班組別：生命科學院甲組、醫學生物科技學程

考試科目（代碼）：細胞生物學(0405、0705)

共 3 頁，第 1 頁 \*請在【答案卡】作答

Part 1 單選題 (每題 2.5 分，共 25 分，答錯不倒扣。請在【答案卡】作答)

1. Microtubules are composed of (A) globular monomers (B) globular dimers (C) homodimers (D) heterodimers (E) tetradimers
2. Microtubules are composed of \_\_\_\_\_ protofilaments. (A) 10 (B) 11 (C) 12 (D) 13 (E) 14
3. \_\_\_\_\_ is a drug that stabilizes microtubules. (A) Colchicine (B) Taxol (C) Nocodazole (D) Vinblastine (E) Phalloidin
4. What is the name of the following molecular motor? (A) Dynein (B) Myosin (C) Actinor (D) Microtubler (E) Kinesin



5. What is the smallest contractile unit of a muscle? (A) Muscle fiber (B) Myofiber (C) Sarcomere (D) Muscle cell (E) Thin filament
6. The protein \_\_\_\_\_ is important for cell-cell adhesion. (A) Intermediate filament (B) E-cadherin (C) Actin (D) Collagen (E) Lamin
7. The protein \_\_\_\_\_ is important for the extracellular matrix. (A) Fibronectin (B) P-Selectin (C) ICAM (D) Neurofilament (E) Myoclosin
8. Desmosomes are critical for (A) electrical integration of cells (B) cell-matrix connection (C) an impermeable apical seal (D) exchange of small metabolites (E) cell-cell connection

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共\_\_3\_\_頁，第\_\_2\_\_頁 \*請在【答案卡】作答

9. In an optical microscope an objective lens has the function to (A) bundle the light from the light source (B) to filter out unspecific scattered light (C) to provide monochrome light (D) to bundle the light within the eyepiece (E) to focus the light that comes from the specimen
10. Atomic force microscope is an (A) optical microscope (B) needs an electron beam (C) has a fine needle that scans on top of a specimen (D) needs a specimen that is fixed with paraformaldehyde (E) needs a sample prepared with an ultra-microtome

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共\_\_3\_\_頁，第\_\_3\_\_頁

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Part 2 問答題 (共 75 分。請在【答案卷】務必依序作答)

1. Please describe how receptor tyrosine kinase acts through (a) Ras-dependent pathway to promote cell proliferation and (b) Ras-independent pathways to promote cell survival (16%)
2. Please describe the current model for the cotranslational import of polypeptides into the ER (9%)
3. What is the relative importance of the  $\text{Na}^+/\text{K}^+$  pump in action potential propagation? (8%)
4. How does a neuron ensure that the action potential propagation is one-way? (8%)
5. Can the movement of charges along an axon truly be considered a “flow”? (9%)
6. Please give a short description for the following given items: (6 %)
  - (a) Biogenesis
  - (b) Autophagy
7. Please describe the differences of rough and smooth endoplasmic reticulum in terms of their structure and function. (10 %)
8. A **bacterial** culture growing at  $37^\circ\text{C}$  is transferred to a culture room maintained at  $25^\circ\text{C}$ . Will the following responses occur? Explain your reasoning. (9 %)
  - (a) Initial decrease in membrane fluidity
  - (b) Gradual replacement of stearate by oleate in the membrane phospholipids
  - (c) Incorporation of more cholesterol into the membrane