

※ 考生請注意：本試題 可 不可 使用計算機

You can answer your questions in Chinese although in English is preferred. (中文作答可,英文作答更佳.)

A. Terminology (名詞解釋, 5 points for each, 25 points in total; briefly describe each term)

1. Regulatory T lymphocyte
2. Homologous recombination
3. Epigenetics
4. Autophagy
5. Chemotaxis

B. Short essay (短問答, 15 points for each, 45 points in total)

1. Briefly describe the mechanisms of host defense to viral infection and how virus may escape from the immune response of humans.
2. Please explain why RNA, instead of DNA or protein, may be the origin of life. (7 points).
Please write down all types of RNA which have been found in mammalian cells, and briefly describe the major functions for each (8 points).
3. "Negative feedback" is a major mechanism for the body to keep homeostasis. Please explain how the body can use "negative feedback" mechanisms to regulate and maintain water (fluid) balance.

C. Proposal writing (研究計畫撰寫, 30 points)

"Stem cell niche" may be defined as "The integration of intrinsic factors and extrinsic cues provided by the surrounding microenvironment to regulate stem cell behaviors." Depending on your background or specialty, please propose a project to address a specified stem cell niche factor which may help answer an important question in stem cell biology or which may potentially lead to a significant improvement of stem cell therapy. Your proposal should focus on a specific topic and include the **title, background & significance, hypothesis, specific aims (2 or 3 only), experimental designs, expected results and alternative approaches**. Your proposal will be scored mainly by the **rationale and novelty**. Please limit your content to about one A4 page for the whole proposal.