國立臺灣師範大學100學年度碩士班招生考試試題

科目：科學教育　　適用系所：生命科學系

注意：1.本試題共 1 頁，請依序在答案卷上作答，並標明題號，不必抄題。2.答案必須寫在指定作答區內，否則不予計分。

I. 請翻譯及解釋以下名詞，並舉例說明在教學實務上的應用。(各題翻譯 2 分，解釋 3 分，舉例 3 分。第 I 大題共 72 分)

1. BSCS 5E Model
2. Scientific Inquiry
3. Two-Tiered Diagnostic Test
4. Laboratory Instruction
5. Project-Based Science
6. Nature of Science
7. Concept Mapping
8. Pedagogical Content Knowledge
9. Four Conditions of Conceptual Change

II. 請閱讀以下文章，寫出摘要，並說明你對這類研究取向的評論。(摘要 5 分，說明評論 5 分。第 II 題共 10 分)

Helping students better understand how scientists reason and argue to draw scientific conclusions has long been viewed as a critical component of scientific literacy, thus remains a central goal of science instruction. However, differences of opinion persist regarding the nature of scientific reasoning, argumentation, and discovery. Accordingly, we employ in inferences of abduction, retroduction, deduction, and induction to introduce a pattern of scientific reasoning, argumentation, and discovery that is postulated to be universal, thus can serve as an instructional framework to improve student reasoning and argumentative skills. We first analyze three varied and presumably representative case histories in terms of the four inferences (i.e., Galileo's discovery of Jupiter's moons, Rosemary and Peter Grants' research on Darwin's finches, and Marshal Nirenberg's Nobel Prize-winning research on genetic coding). Each case history reveals a pattern of reasoning and argumentation used during explanation testing that can be summarized in an *If/then/Therefore* form. We finally summarize additional cases also exemplary of the form.

III. 請舉例說明生物教育中困難概念的特質，並針對一個有此特質的困難概念，設計教學活動協助中學生學習此概念，並且說明為何你預期這樣的教學活動有助於學生學習此困難概念。(說明特質 6 分，教學設計 12 分。第 III 題共 18 分)。