

國立臺灣海洋大學 108 學年度研究所碩士班招生考試試題

考試科目：普通生物學

系所名稱：水產養殖學系碩士班養殖科學組、水產養殖學系碩士班生命科學組

1. 答案以橫式由左至右書寫。2. 請依題號順序作答。

一. 選擇題：(10%)

1. The unit of life in which biological evolution actually occurs is usually considered to be the
(1) adaptive trait of an individual (2) whole organism (3) population (4) community (5) ecosystem
2. Which of the following properties or processes do we associate with living things?
(1) Evolutionary adaptations (2) Energy processing (3) Responding to the environment (4) Growth and reproduction (5) All of the above
3. At which of the following trophic levels is the greatest amount of free energy available?
(1) Producers (2) Decomposers (3) Herbivores (4) Secondary consumers (5) Tertiary consumers
4. If actively growing cells are fed ^{14}C -labeled glucose, what macromolecules will become radioactive first?
(1) Nucleic acids (2) Proteins (3) Fatty acids (4) Starch (5) All of the above
5. A cross between homozygous purple-flowered and homozygous white-flowered pea plants results in offspring with purple flowers. This demonstrates:
(1) Complete dominance (2) Incomplete dominance (3) Over-dominance (4) Co-dominance (5) Mosaic dominance
6. ABO blood type in humans exhibits co-dominance and multiple alleles. What is the likelihood of a type A father and a type B mother having a type O child?
(1) It is impossible (2) 25% if both parents are heterozygous (3) 50% if both parent are heterozygous (4) 25% if only the father is heterozygous (5) 25% if only the mother is heterozygous
7. What colors of light will drive photosynthesis by green plants most efficiently?
(1) Red and blue (2) Red and Yellow (3) Yellow and Green (4) Green only (5) Blue only
8. The complementary RNA sequence for GATCAA is?
(1) CTAGTT (2) CUAGUU (3) TTGATC (4) UUGAUC (5) AACTAG
9. Red algae and brown algae are able to live at greater depths in the ocean than other algae because
(1) they are heterotrophic (2) they have chlorophyll *b* (3) they can withstand cold temperatures (4) their accessory pigments absorb red light (5) their accessory pigments absorb blue and green light
10. To produce radiolabeled transcripts, the isolated nuclei from both liver and brain must have which of the following?
(1) Reverse transcriptase (2) DNA polymerase (3) RNA polymerase (4) Ribosomes (5)

Plasmid DNA

二.問答題：(15%)

1.地球的耕地面積有限，已無法負擔急速增加的世界人口，如何有效且快速地改良品種，提高農業產量或產值，已經成為農業研究的首要目標之一。人類進行遺傳操作至今已數千年，經由選拔育種及雜交等過程，已明顯改變生物的基因體組成，產生無數植物與動物的變異種，更已培育出許多優良的生物品種。然而，現代的基因工程，通常僅引進或修飾一個或少數基因，為何會面臨到如此多的公眾反對意見，請從一專業者角度來詳加解釋此問題。(15%)

三. 為增加水產養殖或觀賞水族培育物種種類，多會自境外移入外來種(alien species)，但外來種引入多有利有弊。請說明引入的好處為何？而在引入前的評估、培育過程的監控，以及可能在形成入侵後的防制策略與積極作為又有哪些?(9%)

四. 請分別說明藍眼淚的形成原因?珊瑚或海葵的發光機制?以及生物發光或螢光可應用於產業的發展潛力。(6%)

五. 觀賞魚業者希望能夠創造出別具形質特徵的水族品系，請就生物學觀點與相關技術，說明可具體採行之策略，以及實際的操作方式。(10%)

六. 請詳細敘述 DNA 複製的過程。(7%)

七. 請詳細敘述 RNA 病毒複製的過程。(10%)

八. 請敘述台灣的生物技術如何能夠幫助水產養殖業的轉型?(8%)

九.

1. Please describe the definition of **autocrine**, **paracrine** and **endocrine**, respectively. (9 %)

2. Please describe how **epinephrine** regulate enzymes involved in **glycogen metabolism** (glycogenolysis & glycogen synthesis) via **protein kinase A (PKA)**. (8 %)

3. Please explain how two **antagonistic hormones** secreted by different cell types of **endocrine pancreas** to maintain the **blood glucose homeostasis** in vertebrates. (8%)