

國立臺灣海洋大學 101 學年度研究所碩士班暨碩士在職專班入學考試試題

考試科目：普通生物學（一）

系所名稱：海洋生物研究所碩士班不分組

1. 答案以橫式由左至右書寫。2. 請依題號順序作答。

PART I：問答題，每題 5 分。（共 20 分）

1. Please describe the structures and functions of the cytoskeleton.
2. Please describe the functions of membrane proteins.
3. Please describe how, in multicellular organisms, cells communicate with each other.
4. Cell cycle consists of four different phases. Please describe the four phases and explain their importance.

PART II：（共 20 分）

1. 請比較單子葉植物與雙子葉植物的初級莖中維管束(vascular bundles)在橫切面的排列情形。(6 分)
2. 請簡述植物的光合作用。(5 分)
3. 請比較苔蘚類、蕨類和種子植物生活史的孢子體和配子體差異。(9 分)

PART III：Multiple-Choice Questions (選擇題, 2% for each) (共 20 分)

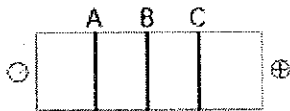
1. The host range of a virus is determined by
 - (A) the enzymes carried by the virus.
 - (B) whether its nucleic acid is DNA or RNA.
 - (C) the proteins in the host's cytoplasm.
 - (D) the enzymes produced by the virus before it infects the cell.
 - (E) the proteins on its surface and that of the host.
2. What are prions?
 - (A) mobile segments of DNA
 - (B) tiny molecules of RNA that infect plants
 - (C) viral DNA that has had to attach itself to the host genome
 - (D) misfolded versions of normal brain protein
 - (E) viruses that invade bacteria

3. The segment of DNA shown in Figure A has restriction sites I and II, which create restriction fragments A, B, and C. Which of the gels produced by electrophoresis shown below best represents the separation and identity of these fragments?



Figure A

(A)



(B)



(C)



(D)



(E)



4. What is the most logical sequence of steps for splicing foreign DNA into a plasmid and inserting the plasmid into a bacterium?
- I. Transform bacteria with a recombinant DNA molecule.
 - II. Cut the plasmid DNA using restriction enzymes.
 - III. Extract plasmid DNA from bacterial cells.
 - IV. Hydrogen-bond the plasmid DNA to nonplasmid DNA fragments.
 - V. Use ligase to seal plasmid DNA to nonplasmid DNA.

- (A) I, II, IV, III, V
- (B) II, III, V, IV, I
- (C) III, II, IV, V, I
- (D) III, IV, V, I, II
- (E) IV, V, I, II, III

5. Which *two* structures play direct roles in permitting bacteria to adhere to each other, or to other surfaces?

- 1. capsules
- 2. endospores
- 3. fimbriae
- 4. plasmids
- 5. flagella

- (A) 1 and 2
- (B) 1 and 3
- (C) 2 and 3
- (D) 3 and 4
- (E) 3 and 5

6. Which of the following is an important source of endotoxin in gram-negative species?

- (A) endospore
- (B) sex pilus
- (C) flagellum
- (D) cell wall
- (E) capsule

7. All protists are

- (A) unicellular.
- (B) eukaryotic.
- (C) symbionts.
- (D) monophyletic.
- (E) mixotrophic.

8. According to the endosymbiotic theory of the origin of eukaryotic cells, how did mitochondria originate?

- (A) from infoldings of the plasma membrane, coupled with mutations of genes for proteins in energy-transfer reactions
- (B) from engulfed, originally free-living proteobacteria
- (C) by secondary endosymbiosis
- (D) from the nuclear envelope folding outward and forming mitochondrial membranes
- (E) when a protoeukaryote engaged in a symbiotic relationship with a protocell

9. *All* fungi share which of the following characteristics?

- (A) symbiotic
- (B) pathogenic
- (C) flagellated
- (D) heterotrophic
- (E) act as decomposers

10. What do fungi and arthropods have in common?

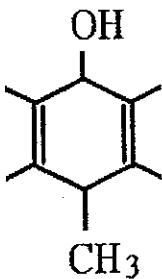
- (A) The protective coats of both groups are made of chitin.
- (B) The haploid state is dominant in both groups.
- (C) Both groups are predominantly heterotrophs that ingest their food.
- (D) Both groups are commonly coenocytic.
- (E) Both groups have cell walls.

PART IV : (共 20 分)

1. Imagine you have just had a meal of pork and rice. Explain how and where these food are chemically digested in your digestive system. (12%)
2. How does your body react thermostatically after you have exercised for 15 minutes? Explain the feedback mechanism in your body to regulate the body temperature. (8%)

PART V : (共 20 分)

1. 請判斷下圖化學結構是否有誤？並指出錯誤的位置及原因。(5%)



2. 請簡述生物的「分類系統」？(6%)
3. 請說明「Natural Selection」與「Artificial Selection」。(6%)
4. 解釋名詞「Homeostasis」。(3%)