

# 國立彰化師範大學103學年度碩士班招生考試試題

系所： 生物學系

科目： 普通生物學

☆☆請在答案紙上作答☆☆

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## 單元一：The Life of the Cell

### 一、單選題 (24%，每題 2%)

1. 構成生物體的主要元素為？  
(A) C, H, O, Fe (B) C, H, O, Na (C) C, H, O, N (D) C, N, O, Na
2. 下列何種物質屬於脂質(lipid)？  
(A) DNA (B) cellulose (C) steroids (D) RNA
3. 下列何種生物分子負責將物質送出(入)細胞？  
(A) DNA (B) phospholipids (C) carbohydrates (D) proteins
4. 下列何種物質屬於單糖(monosaccharides)？  
(A) glucose (B) starch (C) glycogen (D) cellulose
5. 下列選項中，何者屬於蛋白質的二級構造(secondary structure)？  
(A) an amino acid sequence (B) an alpha helix  
(C) a globular shape (D) a protein complex
6. 粒線體的功能為何？  
(A) cellular respiration (B) lipid synthesis  
(C) photosynthesis (D) intracellular digestion
7. 下列何種反應可以用於合成葡萄糖？  
(A) glycolysis (B) photosynthesis (C) fermentation (D) cellular respiration
8. 染色體複製(duplication of chromosomes)發生在細胞週期的那個階段(phase)？  
(A) S (B) G1 (C) M (D) G2
9. 葉綠體的功用為何？  
(A) cellular respiration (B) lipid synthesis  
(C) photosynthesis (D) intracellular digestion
10. 下列何種酵素的主要功能是幫助蛋白質折疊(folding)？  
(A) chaperonin (B) lysozyme (C) kinase (D) phosphatase
11. 下列何種細胞含有兩條相同的染色體(two homologous sets of chromosomes)？  
(A) *E. coli* (B) human sperms  
(C) human skin cells (D) human egg cells
12. 下列何種生物分子不是由胺基酸所組成？  
(A) hemoglobin (B) cholesterol (C) antibodies (D) insulin

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## 單元二：Cellular Reproduction and Genetics

### 二、單選題（15%，每題 1%）

- Mendel conducted his most memorable experiments on  
(A) guinea pigs (B) fruit flies (C) roses (D) peas
- Linked genes generally  
(A) show pleiotropy (B) show incomplete dominance  
(C) reflect a pattern of codominance (D) do not follow the laws of independent assortment
- Which of the following statements regarding DNA is *false*?  
(A) DNA uses the sugar deoxyribose  
(B) DNA uses the nitrogenous base uracil  
(C) DNA molecules have a sugar-phosphate backbone  
(D) One DNA molecule can include four different nucleotides in its structure
- If one strand of DNA is CGGTAC, the corresponding strand would be  
(A) GCCATG (B) GCCAUC (C) GCCTAG (D) TAACGT
- Which of the following options best depicts the flow of information when a gene directs the synthesis of a cellular component?  
(A) DNA → tRNA → mRNA → protein  
(B) RNA → DNA → RNA → protein  
(C) protein → RNA → DNA  
(D) DNA → RNA → protein
- We would expect that a 15-nucleotide sequence ending with a stop codon will direct the production of a polypeptide that consists of  
(A) 3 amino acids (B) 2 amino acids (C) 4 amino acids (D) 5 amino acids
- A gene operon consists of  
(A) a transcribed gene only (B) a regulatory gene only  
(C) a promoter only (D) transcribed genes, an operator, and a promoter
- The basis of cellular differentiation is  
(A) selective gene expression (B) cloning  
(C) mutation (D) the operon

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9. RNA splicing involves the
  - (A) removal of introns from the molecule
  - (B) removal of exons from the molecule
  - (C) addition of a nucleotide "tail" to the molecule
  - (D) addition of a nucleotide "cap" to the molecule
10. Small pieces of RNA that can regulate translation of mRNA are called
  - (A) microRNA
  - (B) monoRNA
  - (C) minuteRNA
  - (D) miniRNA
11. In the process of human gene cloning using plasmids, the bacterial plasmid
  - (A) is the source of the gene to be cloned
  - (B) functions as a vector
  - (C) is used to insert the human gene into the bacterial chromosome
  - (D) is cultured inside the human cell, which contains the gene to be cloned
12. The enzyme that converts information stored in their RNA to information stored in DNA is
  - (A) RNA polymerase
  - (B) reverse transcriptase
  - (C) DNA ligase
  - (D) a restriction enzyme
13. A nucleic acid probe is
  - (A) an enzyme that locates a specific restriction site on RNA
  - (B) a piece of radioactively labeled DNA that is used to locate a specific gene
  - (C) a virus that transfers DNA to a recipient cell
  - (D) a plasmid that recognizes a specific DNA sequence
14. Broccoli, cabbages, and brussels sprouts all descend from the same wild mustard and can still interbreed. These varieties were produced by
  - (A) natural selection
  - (B) inheritance of acquired characteristics
  - (C) genetic drift
  - (D) artificial selection
15. Which of the following represents a pair of homologous structures?
  - (A) the wing of a bat and the scales of a fish
  - (B) the wing of a bat and the flipper of a whale
  - (C) the wing of a bat and the wing of a butterfly
  - (D) the antennae of an insect and the eyes of a bird

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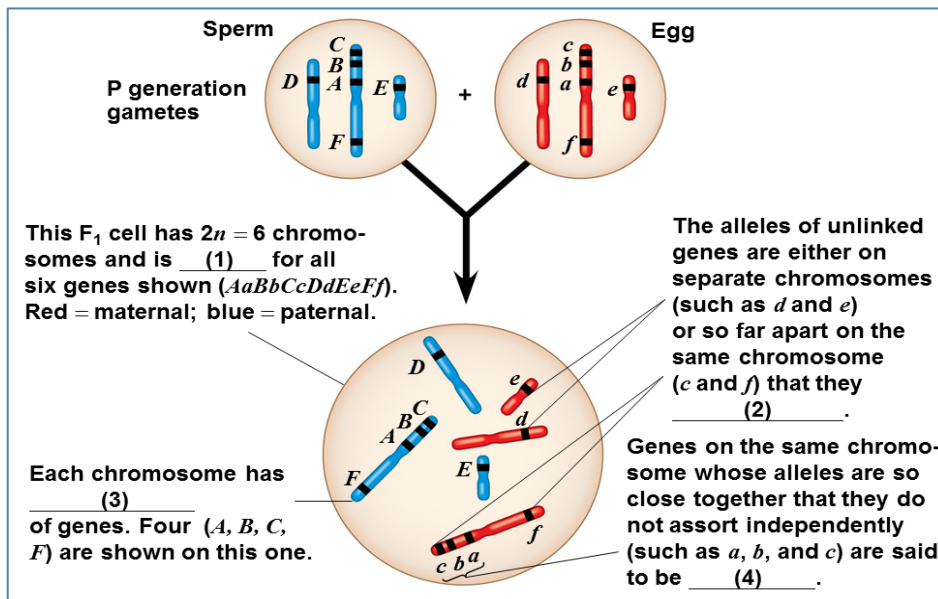
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三、配合題：依據圖說在(1)~(4)格中填入適當的字詞(A)~(D) (4%)

參考答案：

(A) genetically linked	(B) hundreds or thousands
(C) heterozygous	(D) assort independently



四、簡答題：請簡答並寫出何謂 Karyotyping 與其醫學應用實例？ (6%)

## 單元三：Animals: Form and Function

五、名詞解釋 (25%，每題 2.5%)

1. Receptor desensitization
2. Post-synaptic potential
3. Alveolar dead space
4. Acrosome reaction
5. Open circulatory system
6. Homeostasis
7. Giantism
8. Stress response
9. Hermaphroditism
10. Hepatic portal vein

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## 單元四：Evolution and Ecology

### 六、問答題 (16%)

1. 請您說明生物種(biological species)的定義及發生物種種化(speciation)的可能機制。 (6%)
2. 請您說明入侵種(invasive species)的定義及其對原生物種之影響。 (5%)
3. 請您說明生物多樣性的意涵與其重要性為何。 (5%)

## 單元五：Plants: Form and Function

### 七、問答題 (10%)

1. 請說明陸生植物適應陸域環境所演化出的特徵。 (5%)
2. 請您舉一例子並詳述植物與其他物種互利共生的現象。 (5%)