國立中興大學 106 學年度碩士班招生考試試題

科目：生物化學　　系所：植物病理學系乙組

本科目不得使用計算機　　本科目試題共 2 頁

單選題 (24%) (每題 2 分，答錯倒扣 0.5 分)

1. Two amino acids of the standard 20 contain sulfur atoms. They are:
   A) cysteine and serine. B) cysteine and threonine. C) methionine and cysteine
   D) methionine and serine E) threonine and serine.

2. An individual molecular structure within an antigen to which an individual antibody binds is as a(n):
   A) antigen. B) epitope. C) Fab region. D) Fc region E) MHC site.

3. A repeating structural unit in a multimeric protein is known as a(n):
   A) domain. B) motif. C) oligomer. D) protomer. E) subunit.

4. In a tissue that metabolizes glucose via the pentose phosphate pathway, C-1 of glucose would be expected to end up principally in:
   A) carbon dioxide. B) glycogen. C) phosphoglycerate. D) pyruvate. E) ribulose 5-phosphate.

5. All of the following enzymes involved in the flow of carbon from glucose to lactate (glycolysis) are also involved in the reversal of this flow (gluconeogenesis) ***except:***
   A) 3-phosphoglycerate kinase. B) aldolase. C) enolase. D) phosphofructokinase-1.
   E) phosphoglucoisomerase.

6. Which of the following is *not* an intermediate of the citric acid cycle?
   A) Acetyl-coA B) Citrate C) Oxaloacetate D) Succinyl-coA E) α-Ketoglutarate

7. Saturated fatty acids are degraded by the stepwise reactions of β oxidation, producing acetyl-CoA. Under aerobic conditions, how many ATP molecules would be produced as a consequence of removal of each acetyl-CoA?
   A) 2 B) 3 C) 4 D) 5 E) 6

8. The amino acids serine, alanine, and cysteine can be catabolized to yield:
   A) fumarate. B) pyruvate. C) succinate. D) α-ketoglutarate. E) none of the above.

9. In photophosphorylation, absorption of light energy in chloroplast "light reactions" leads to:
   A) absorption of CO_2 and release of O_2. B) absorption of O_2 and release of CO_2.
   C) hydrolysis of ATP and reduction of $NADP^+$. D) synthesis of ATP and oxidation of NADPH.
   E) use of iron-sulfur proteins.

10. In the carbon assimilation ("dark") reactions of photosynthesis, the biosynthesis of 1 mol of hexose from 6 mol of carbon dioxide requires:
    A) 12 mol of NADPH and 12 mol of ATP. B) 12 mol of NADPH and 18 mol of ATP.
    C) 18 mol of NADPH and 12 mol of ATP. D) 18 mol of NADPH and 18 mol of ATP.
    E) no NADPH and 12 mol of ATP.

11. In "C_4" plants of tropical origin, the first intermediate into which $^{14}CO_2$ is fixed is:
    A) aspartate. B) phosphoenolpyruvate. C) oxaloacetate. D) malate. E) 3-phosphoglycerate.

12. In comparison with DNA-DNA double helices, the stability of DNA-RNA and RNA-RNA helices is:
    A) DNA-DNA > DNA-RNA > RNA-RNA. B) DNA-DNA > RNA-RNA > DNA-RNA.
    C) RNA-DNA > RNA-RNA > DNA-DNA. D) RNA-RNA > DNA-DNA > DNA-RNA.
    E) RNA-RNA > DNA-RNA > DNA-DNA.

 背面有題，請繼續作答。

問答 (54 %):

1. Compare the process by which translation (protein synthesis) is initiated in *E coli* with that in eukaryotes. (10%)
2. The SOS response in *E. coli* is triggered by extensive damage to the cell's DNA and increases the capacity for repairing such DNA. What molecular events bring about expression of the SOS genes? (9%)
3. Following the synthesis of the polypeptide chain, many proteins require further posttranslational modifications before they attain their full biological activity or function. List and describe briefly at least five possible types of modification that can occur. (10%)
4. Draw the structures of (1) glutamate, (2) proline, (3) cyclic AMP, (4) histidine, and (5) cystine. (15%)
5. Diagram and describe the basic structure of an IgG protein molecule. (10%)

解釋名詞 (22%)

1. Loop-mediated isothermal amplification
2. CRISPR/Cas9 system
3. RNA interference
4. Next Generation Sequencing (NGS)
5. MALDI-TOF
6. ribozyme
7. two dimensional gel electrophoresis
8. introns and exons
9. allosteric enzyme
10. amino acid activation
11. ubiquitin