

第一部分：總分 50 分

一、填充題(20%)：〈作答時請將答案序號標示清楚〉

1. Polypeptide N 端之氨基酸可以用 a 法來測定，而 C 端則用 b 來決定。
2. 哺乳類細胞 DNA 之修補(repair)需要很多 酶的聯合作用，其中三個為 c ， d 和 e 。
3. 蛋白質結構(conformation)之維持，一般靠的是 noncovalent interaction，它們是 f ， g 和 h 。蛋白質摺疊(folding)之過程一般需
 要另一種蛋白質的幫助，此種蛋白質稱為 i ，它們是 heat shock proteins。
4. NAD⁺ 是 j 的縮寫。

二、問答題(30%)

1. 請比較 Noninsulin-dependent diabetes mellitus(NIDDM)與 insulin-dependent diabetes mellitus(IDDM)之 amino acids, glucose, 及 fat 在 liver, adipose tissue 和 muscle tissue 之代謝。最近發現 tumor necrosis factor- α (TNF- α)與 NIDDM 有關，亦請說明之。(20%)
2. Programmed cell death, or apoptosis, 是一種細胞自毀的行為，以便個體受益。請問 apoptosis 有何特徵？請列舉二則，並以之說明 ovarian cycle(月事)時子宮膜之血崩。(10%)

第二部分：總分 50 分

- I) Please describe the techniques commonly used in the purification of proteins today. (10%)
- II) A polypeptide was isolated in pure form. A sample of the polypeptide was treated with 2,4-dinitrofluorobenzene. The reagent adds to an alanine residue. A second sample was treated with cyanogen bromide (CNBr). The fragments were isolated and sequenced. A third sample was digested with trypsin. The trypsin fragments were also isolated and sequenced. The sequences of the CNBr and trypsin fragments are as follows:

CNBr fragments	Trypsin fragments
1. Cys-Asp-Val-Leu	1. Phe-Asn-Arg
2. Ala-Gly-Pro-Met	2. Gly-His-Met-Leu-Arg
3. Leu-Arg-Val-Ile-Trp-Met	3. Ala-Gly-Pro-Met-Ser-Thr-Lys
4. Gln-His-Lys-Tyr-Phe-Met	4. Val-Ile-Trp-Met-Gln-His-Lys
5. Ser-Thr-Lys-Phe-Asn-Arg-Gly-His-Met	5. Tyr-Phe-Met-Cys-Asp-Val-Leu

What is the polypeptide's sequence? (6%) How could you confirm this sequence by using chymotrypsin? (4%)

III) Select the best answer(s): (2% of each)

1) Which one of the following phospholipid carry one negative charge?

- A) phosphatidylcholine
- B) phosphatidylethanolamine
- C) phosphatidylserine
- D) sphingomyelin
- E) diphosphatidylinositol

2) Which one of the following lipid could directly activate protein kinase C:

- A) phosphatidylinositol-3,4,5-triphosphate
- B) diacylglycerol
- C) lysophosphatidic acid
- D) arachidonic acid
- E) inositol-3,4,5-triphosphate

3) Which of the following fatty acids can be covalently attached to proteins and serve to anchor proteins into the lipid bilayer?

- A) myristic acid
- B) palmitic acid
- C) palmitoleic acid
- D) steric acid
- E) oleic acid

4) The y-intercept of a Lineweaver-Burk plot is

- A) V_{max}
- B) $-1/V_{max}$
- C) $1/V_{max}$
- D) $-1/K_M$
- E) K_M

5) Enzymes can do each of the following except

- A) stabilize the transition state.
- B) impose a proper orientation on substrate molecules.
- C) put a strain on a susceptible bond.
- D) lower the ΔG of the reaction.
- E) form covalent bonds with reactant molecules.

6) Each of the following amino acids is likely to be in the hydrophobic region of an integral-membrane protein except:

- A) leucine

- B) phenylalanine
 - C) valine
 - D) methionine
 - E) threonine
- 7) The two glycolytic enzymes that are directly involved in converting ADP to ATP are
- A) hexokinase and 6-phosphofructo-1-kinase
 - B) glyceraldehyde-3-phosphate dehydrogenase and enolase
 - C) hexokinase and pyruvate kinase
 - D) 6-phosphofructo-1-kinase and pyruvate kinase
 - E) phosphoglycerate kinase and pyruvate kinase
- 8) The Gs protein complex
- A) is a soluble enzyme in the cytoplasm.
 - B) contains a subunit that can hydrolyze GTP.
 - C) binds cAMP.
 - D) binds adrenaline or glucagon.
 - E) catalyzes the phosphorylation of protein kinase.
- 9) The insulin receptor
- A) is located on the nuclear membrane.
 - B) catalyzes autophosphorylation.
 - C) is very similar to the glucagon receptor.
 - D) consists of two subunits.
 - E) is a lipid.
- 10) Of the following inhibitors, the only one that will not block both oxygen consumption and ATP synthesis in normal mitochondria is
- A) oligomycin
 - B) 2,4-dinitrophenol
 - C) rotenone
 - D) antimycin A
 - E) cyanide
- 11) Topoisomerases
- A) stabilize single-stranded DNA
 - B) can use the energy stored in phosphodiester bonds to melt DNA.
 - C) can convert supercoils to relaxed circles.
 - D) can use the energy in ATP to unwind double-stranded DNA.
 - E) hydrolyze double-stranded DNA.

(背面仍有題目,請繼續作答)

- 12) The melting temperature of double-stranded DNA molecules depends on each of the following except:
- A) the salts present in solution
 - B) $(A+T)/(C+G)$
 - C) pH
 - D) single-stranded DNA-binding protein
 - E) topoisomerase
- 13) Histones have an unusually high percentage of
- A) glycine and proline
 - B) cysteine and methionine
 - C) phenylalanine and tyrosine
 - D) glutamate and aspartate
 - E) lysine and arginine
- 14) The eukaryotic enzyme that is responsible for the formation of pre-mRNA is called
- A) RNA polymerase I
 - B) RNA polymerase II
 - C) RNA polymerase III
 - D) reverse transcriptase
 - E) telomerase
- 15) Gel filtration chromatography is used to separate molecules by
- A) size
 - B) ionic charge
 - C) binding specificity
 - D) isoelectric pH
 - E) none of the above