

**(A) Define the following terms : (30%)**

- 1)  $\beta$  turn and  $\gamma$  turn in polypeptide chain
- 2) Sequential model and concerted model of allosteric enzymes
- 3) Light and dark reactions in two-system photosynthesis
- 4) *De novo* pathway and salvage pathway in nucleotide synthesis
- 5) Helicase and topoisomerase

**(B) Answer the following questions :**

- 1)
  - a) Outline the arrangement of respiratory complexes in the electron transport chain. (5%)
  - b) What characteristic do ubiquinone and cytochrome c have in common? What is their physical location in the cells? (4%)
  - c) What is the immediate role of electron transfer in the respiratory chain? (4%)
- 2)
  - a) Many people, especially Asians, suffer severe intestinal distress on consuming milk or milk products. Explain the reason why. (4%)
  - b) Amino acids and sugars absorbed into the intestinal cells move into the portal bloodstream and are carried via the liver and then to the rest of the body. What happens to the absorbed digestion products of fats? (4%)
- 3)
  - a) The Lesch-Nyhan syndrome is a severe genetic disease in children. Discuss its biochemistry. (5%)
  - b) Explain how the antileukemic drug methotrexate inhibit cancer cell reproduction. (4%)
  - c) The symptoms of pernicious anemia resemble, in some respects, those of folate deficiency. What is a possible reason for this? (4%)

(背面仍有題目,請繼續作答)

- 4) a) A small DNA molecule was cleaved with several different restriction nucleases, and the size of each fragment was determined by gel electrophoresis. The following data were obtained. (8%)

Enzyme	Fragment Size (kb)
<i>EcoRI</i>	1.3, 1.3
<i>HpaII</i>	2.6
<i>HindIII</i>	2.6
<i>EcoRI</i> + <i>HpaII</i>	1.3, 0.8, 0.5
<i>EcoRI</i> + <i>HindIII</i>	0.6, 0.7, 1.3

- (a) Is the original molecule linear or circular? Explain why.  
 (b) Draw a map of restriction sites, showing distances between sites, that is consistent with the data presented.  
 (c) How many additional maps are compatible with the data?  
 (d) What would have to be done to locate the cleavage sites unambiguously with respect to each other?
- b) What is a dideoxynucleoside triphosphate? What is the precise function of these in the Sanger technique of DNA sequencing? (6%)
- 5) a) cAMP and cGMP are not the only second messengers. Describe another system. (5%)  
 b) Explain how does nitric oxide exert its controlling effect. (5%)
- 6) a) What is doping? Describe the different types and effects of illegal drugs used in doping. (6%)  
 b) Describe the basic principles, functions and applications of capillary electrophoresis. (6%)