

※ 考生請注意：本試題不可使用計算機。 請於答案卷(卡)作答，於本試題紙上作答者，不予計分。

Part I 問答題 (70%):

1. (a). What are the four different levels of protein structure? Given the name and describe the distinguishing feature of each. Include what types of bonds help to stabilize each structural level (12%).
(b). Are all proteins required to have all four levels of structures (2%)? Please explain your answer (2%).
(c). What is the approximate molecular weight of a protein with 731 amino acid residues in a single polypeptide chain? Please explain your answer. (4%)
(d) Explain why replacing one amino acid in a protein with another one may cause the protein to malfunction (2%).
2. A protein has a molecular mass of 420 kDa when measured by gel filtration. When subjected to gel electrophoresis in the presence of sodium dodecyl sulfate (SDS), the protein gives three bands with molecular masses of 200, 160, and 60 kDa. When electrophoresis is carried out in the presence of SDS and dithiothreitol, three bands are again formed, this time with molecular masses of 160, 100, and 60 kDa. Determine the subunit composition of the protein and please explain your answer (4%).
3. The glyoxylate cycle, a variation of the tricarboxylic acid cycle, is an anabolic pathway occurring in plants, bacteria, protists, and fungi. Please draw a diagram to show the metabolic pathway and regulation of glyoxylate cycle in plants, and describe the purposes and importance of glyoxylate cycle (10%).
4. What are the main theoretical models that try to explain the formation of the enzyme-substrate complex (4%)?
5. Differentiate between uncompetitive inhibition and non-competitive inhibition in ENZYMOLOGY (4%).
6. Many biomolecules are derived from amino acid precursors. Name the correct precursor for the following biomolecules. (1). Serotonin (2). Histamine (3). Epinephrine (6%)

編號：60

國立成功大學 109 學年度碩士班招生考試試題

系 所：生命科學系

考試科目：生物化學

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7. Why a fat is usually a much better fuel than a carbohydrate? Please explain your answer by comparing the structure of a carbohydrate with that of a fat. (4%)
8. Name three environmental factors that affect the rate of photorespiration and explain how they do it (6%).
9. There are three major types of photosynthesis metabolism in the plants, called C3 metabolism, C4 metabolism and crassulacean acid metabolism (CAM).
 - (a) What is an example of a plant that uses CAM (2%)?
 - (b) Compare the aspects of CO₂ fixation and crop yield between C3 and C4 plants? (8%)

Part II 名詞解釋 (30%, 6 x 5%):

1. massively parallel sequencing
2. nucleosome
3. reporter gene
4. homologous recombination
5. transposon
6. spliceosome