

國立中山大學 102 學年度碩士暨碩士專班招生考試試題

科目名稱：生物化學【生科系碩士班乙組】

題號：421001

※本科目依簡章規定「不可以」使用計算機

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問答題 (100 分)

1. Give the reasons for the following facts or observations: (20 分, 每小題 4 分)
 - (1) DNA contains thymine (T) instead of uracil (U).
 - (2) DNA is chemically more stable than RNA.
 - (3) Triacylglycerols are the molecules of choice for energy storage.
 - (4) Glycerophospholipids are the essential components of cell membranes.
 - (5) Monosaccharides are reducing sugars.
2. Protein structure can be described in terms of four levels of organization: (20 分, 每小題 10 分)
 - (1) Define each level of the structural organization.
 - (2) Describe how each level of the protein structure is maintained.
3. The Michaelis-Menten equation is the fundamental equation of enzyme kinetics. This equation says that the initial rate (v) of an enzyme reaction is determined by two constants (K_m and V_{max}) and the initial concentration of substrate ($[S]$): (20 分, 每小題 5 分)
 - (1) Write out this equation.
 - (2) Describe the important assumptions underlie this equation.
 - (3) Describe the practical significance of K_m and V_{max} .
 - (4) Explain that why allosteric enzymes do not follow this equation.
4. Metabolic pathways are usually divided into the catabolic pathways and the anabolic pathways: (12 分, 每小題 6 分)
 - (1) Describe the features that generally distinguish the pathways of catabolism from the pathways of anabolism.
 - (2) Considering the gluconeogenesis pathway and glycolysis pathway; explain why anabolic pathways and catabolic pathways differ.
5. Describe how ATP is formed through the substrate-level phosphorylation and the oxidative phosphorylation. (12 分)
6. Define and contrast the following pairs of terms: (16 分, 每小題 4 分)
 - (1) Integral membrane protein and peripheral membrane protein
 - (2) Glycerol-phosphate shuttle and malate-aspartate shuttle
 - (3) Nucleoside and nucleotide
 - (4) Ketogenic amino acid and glucogenic amino acid