

科目： 生物化學

系所組： 營養科學系碩士班

Assay questions:

1. Explain the effects of each of the following on the rates of gluconeogenesis and glycogen metabolism: (15%)
  - (1) Increasing the concentration of tissue fructose-1,6-bisphosphate
  - (2) Decreasing the concentration of blood glucose
  - (3) Increasing the amount of blood insulin
  - (4) Increasing the concentration of tissue AMP
  - (5) Decreasing the concentration of fructose-6-bisphosphate
2. How do proteoglycans modulate processes in cells and organisms? (15%)
3. Calculate the volume (liters) of metabolic water available to a camel through complete fatty acid oxidation if it carries 10 kg of tripalmitin in its hump. (10%)  
(Hint: assume  
$$C_{15}H_{31}CO-CoA + 108 Pi + 108 ADP + 23 O_2 \rightarrow 108 ATP + 16 CO_2 + 123 H_2O + CoA$$
)
4. Give an example to describe how is secondary active transport driven by ion gradient? (10%)
5. Answer the following questions regarding urea cycle:
  - (1) Explain the metabolic process and the related cellular compartmentalization of this cycle. (10%)
  - (2) What are the major metabolic contributions of urea cycle to vertebrates, such as humans? (5%)
  - (3) How do hepatocytes handle the energy needs of urea cycle? (5%)
6. Explain the causes and the consequences of the following metabolic disorders. (10%)
  - (1) Maple syrup urine disease
  - (2) Lesch-Nyhan syndrome
7. Explain the differences in definition and metabolic fates of the following pairs of terms. (10%)
  - (1) Essential vs. nonessential amino acids
  - (2) Glucogenic vs. ketogenic amino acids
8. Draw a diagram to describe the preferred fuels and their metabolic relationship among liver, heart, adipose tissue, brain and skeletal muscle when a person has been starved for 3 days. (10%)

※ 注意：1.考生須在「彌封答案卷」上作答。

2.本試題紙空白部份可當稿紙使用。

3.考生於作答時可否使用計算機、法典、字典或其他資料或工具，以簡章之規定為準。