

一、解釋名詞：20 % (每題二分)

1. SNP
2. salvage pathways
3. entropy
4. ketosis
5. cellular senescence
6. isozyme
7. Lesch-Nyhan syndrome
8. carcinogenesis
9. enantiomers
10. uncoupling agents:

二、簡答題：30 %

- 1 有一混合胺基酸溶液 Lys, Tyr, Glu, Ala, Arg, Asp，加入一陰離子交換樹脂(pH 12)，試問當 pH 逐漸下降時，這些胺基酸分離的順序為何? (4%)
2. What is a neurotransmitter formed from tyrosine by hydroxylation and decarboxylation reactions. (2%)
3. Affinity for Oxygen of Hemoglobin. What is the effect of the following changes on the O<sub>2</sub> affinity of hemoglobin? (a) A drop in the pH of blood plasma from 7.4 to 7.2. (b) A decrease in the partial pressure of CO<sub>2</sub> in the lungs from 6 kPa (holding one's breath) to 2 kPa (normal). (c) An increase in the BPG level from 5 mM (normal altitudes) to 8 mM (high altitudes). (d) An increase in CO from 1.0 parts per million (ppm) in a normal indoor atmosphere to 30 ppm in a home that has a malfunctioning or leaking furnace. (4%)
4. Draw the structures of β-D-fructofuranose and β-D-fructopyranose. (4%)
5. Describe the molecular steps necessary for the generation of force in muscle. (4%)
6. Why are the vitamins niacin and riboflavin necessary for metabolism? (4%)
7. What is the role of Acetyl-CoA in catabolism? (4%)
8. Which enzyme is the major control point for glycolysis in muscle? (2%)
9. What is the sequence of start codon? (2%)

三、選擇：20%

1. Which of the following is at a higher level of oxidation than CH<sub>3</sub>CHO?  
A) CH<sub>3</sub>CH<sub>2</sub>OH B) CH<sub>3</sub>CH<sub>3</sub> C) CH<sub>2</sub>=CH<sub>2</sub> D) CH<sub>3</sub>CO<sub>2</sub>H E) none of the above
2. How many electrons do (does) the prosthetic group(s) in cytochrome c accept?  
A) none B) two C) one D) one or two E) four

3. 溫度對酵素反應的影響是：  
 A)溫度從 50°C 升高 10°C，其反應速率加倍 B)能降低反應的活化能 C)在酵素被破壞前每增加 10°C 反應速率加倍 D)超過 50°C，反應速率隨著溫度增加而減少
4. 下列那一個維生素為 coenzyme A 的先驅物？  
 A)核黃素 (riboflavin) B)菸鹼酸 (nicotinic acid) C)泛酸 (pantothenic acid)  
 D)生物素 (biotin)
5. 當反應中存在 competitive inhibitor 時，有關酵素反應 kinetics 變化，下列那一個敘述正確？  
 A) $V_{max}$  減少， $K_m$  減少 B) $V_{max}$  減少， $K_m$  不變  
 C) $V_{max}$  不變， $K_m$  增加 D) $V_{max}$  增加， $K_m$  減少
6. 下列化合物中哪個不含腺甘酸組分： A)CoA B)FMN C)FAD D)NAD<sup>+</sup>
7. The  $\beta$  cells of the islets of Langerhans secrete \_\_\_\_\_ in response to \_\_\_\_\_ glucose levels; the  $\alpha$  cells release \_\_\_\_\_ in response in response to \_\_\_\_\_ glucose levels.  
 A) insulin, low; glucagon, low B) insulin, high; glucagon, low  
 C) glucagon, low; insulin, high D) glucagon, high; insulin, high  
 E) none of the above
8. Rank the melting points of the following fatty acids:  
 (1) *cis*-oleate (18:1) (2) *trans*-oleate (18:1) (3) linoleate (18:2)  
 A) 1 > 2 > 3 B) 2 > 1 > 3  
 C) 2 > 3 > 1 D) 3 > 1 > 2  
 E) none of the above
9. Which of the following is most likely to form a liposome?  
 A) Fatty acids B) Triacylglycerols C) Glycerophospholipids D) Steroids  
 E) None of the above
10. Vitamin B<sub>1</sub> is a component of the coenzyme  
 A) phosphofructokinase B) pyruvate C) thiamine pyrophosphate D) ATP  
 E) pentose phosphate

#### 四、問答題：30%

1. What are the symptoms of diabetes mellitus?
2. Some antibiotics are small organic molecules that act as inhibitors of the biochemical pathways by which peptidoglycans are synthesized. Why are these antibiotics so effective against bacterial disease? Why do antibiotics sometimes become less effective over time?
3. How can the levels of lactate dehydrogenase in the blood be correlated to heart disease?