慈濟大學95學年度
研究所碩士班招生考試命題紙

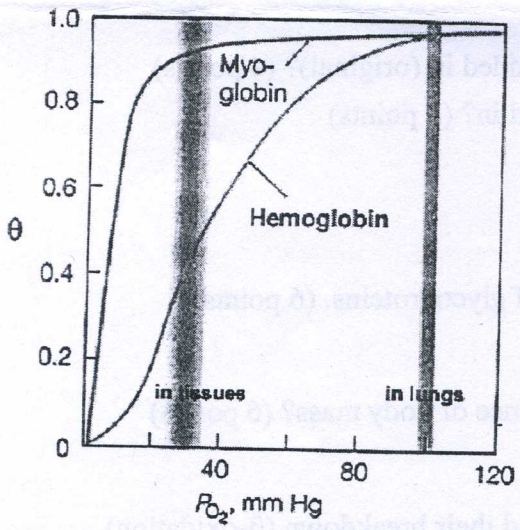
科目：生物化學

下列所有題目的答案請按順序都寫在答題本第3頁至16頁的橫格紙內

1. Among the 20 amino acids normally found in proteins, there are three of them containing **aromatic R (functional) groups**. Please give the **full names, three letter abbreviations**, and **one letter symbols** of these amino acids (3 points).

2. What are the **de novo** synthesis and the **salvage** synthesis of nucleotides? (4 points)

3. The graph below shows the relationship between the environmental P_{O2} and the O_2 saturation (θ) of **Hemoglobin** and **Myoglobin**. Please give a simple explanation to this graph and point out the **physiological importance** of the two difference curves in the graph (8 points).



4. In experiments of enzymatic reaction and enzyme inhibition, following data were collected:

[S] (mM)	v_0 (μM/min) (original)	v_0 (μM/min) (inhibitor added)	
0.5	0.8333		0.5555
0.6667	1.0000		0.6666
1	1.2500		0.8333
2	1.6666		1.1111
10	2.2727	1.5151	

* [S]: substrate concentration; v_0: initial rate of enzyme catalytic reaction.
* original: enzyme reaction free of inhibitor.
* inhibitor added: enzyme reaction with added inhibitor.

(a) Please plot the **Lineweaver-Burk** curves of these two experiments (two curves in the same graph). (4 points)

(b) What were the V_{max} and K_M for the enzyme **without** inhibitor added in (original)? (4 points)

(c) What were the V_{max} and K_M for the enzyme **with** inhibitor added in? (4 points)

(d) What kind of inhibition did the inhibitor perform? (2 points)

5. Name two biochemical effects of the oligosaccharide potions of glycoproteins. (6 points)

6. What is leptin? How does it function in the long-term maintenance of body mass? (6 points)

7. Compare (列表比較) the fatty acid synthesis (synthase path) and their breakdown (β-oxidation) pathways in animals, in terms of :
   a) cellular location of the process, b) electron carrier coenzyme(s), c) rate-limiting step (or enzyme), d) acyl carrier, and e) basic units added or removed (12 points)

8. A very potent and specific inhibitor of the mitochondrial ATP synthase is added to cultured liver cells to completely inhibit this enzyme while these cells are carrying out the oxidation of glucose under aerobic condition. Please indicate whether each of the following statements about the effect of this inhibitor is true (請用○表示) or false (請用╳表示) (10 points)

____ a. The cell will switch to fatty acid oxidation as an alternative to glucose oxidation, and the inhibitor will therefore have no effect on ATP production

____ b. ATP production in the cell will soon drop to zero

____ c. The rate of oxygen consumption will decrease

____ d. The rate of glucose consumption by this cell will decrease sharply

____ e. The citric acid cycle will speed up to compensate

9. Order the steps (排先後順序，寫號碼即可) leading to glycogen breakdown resulting from the stimulation of liver cells by glucagon (5 points)
   a) Activation of protein kinase (PKA)
   b) cAMP levels rises
   c) Phosphorylation of phosphorylase b
   d) Phosphorylation of phosphorylase b kinase
   e) Stimulation of adenyl cyclase

10. A graduate student works on PCR assay; she starts the reaction by adding 10^3 copies of template DNA molecules. After 30 cycles of amplification, what is the amount of DNA products (copy number) she supposes to get? (Assuming the Taq enzyme reaction efficiency is 100%.) (8 points)

11. Why are *E. coli* $tRNA^{fMet}$ (initiator) and $tRNA^{Met}$ (elongator) aminoacylated with methionine but the corresponding amber suppressor tRNA ($tRNA^{fMet}CUA$ and $tRNA^{Met}CUA$) are aminoacylated with glutamine and lysine respectively? (8 points)

12. Please describe the basic components needed for the cell free (in vitro) translation system. (8 points)

13. Please design methods to analyze the three activities: 5' to 3' polymerization, 5' to 3' exonulease, 3' to 5' exonuclease found in DNA polymerase. (8 points)