

國立成功大學
110學年度碩士班招生考試試題

編 號：56

系 所：生命科學系

科 目：生物化學及分子生物學

日 期：0203

節 次：第 3 節

備 註：不可使用計算機

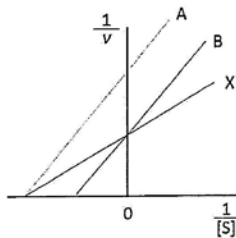
※ 考生請注意：本試題不可使用計算機。請於答案卷(卡)作答，於本試題紙上作答者，不予計分。

Part I: (Total 35 points)

1. The Lineweaver-Burt plot below showing line A for enzyme X with inhibitor A, line B for enzyme X with inhibitor B, and line X for enzyme X only.

(A) The inhibition of which inhibitor could **NOT** be reversed when we add more substrates to the reaction? (1 point)

(B) Which inhibitor would increase K_m ? (1 point)



2. We are going to do site-directed mutagenesis to alter some amino acid residues on chymotrypsin.

Please describe the influences (activation or inhibition or no influence) of changing Ser195 to be Gly in the active site. Why? (2 points)

Please describe the influences (activation or inhibition or no influence) of changing Asp102 to be Glu in the active site. Why? (2 points)

3. Please briefly explain the following terms.

(A) Isozymes (2 points)

(B) Phosphatase (2 points)

(C) Phosphorylase (2 points)

(D) Caveola (2 points)

4. Other than phosphorylation, please give another example of covalent modifications that regulate protein functions and also indicate which amino acid side chain is the modification site. (2 points)

What are the functions of sirtuins? (2 points)

5. What is the difference between substrate-level phosphorylation and oxidative phosphorylation? (3 points)

6. What are the metabolic fates of NADH and pyruvate produced in glycolysis under aerobic and anaerobic conditions? (4 points)

7. Please briefly describe the tricarboxylic acid (TCA) cycle and what is the purpose of TCA cycle. (5 points)

8. Please describes the order of electron movement in the electron transport chain in the mitochondria. (5 points)

Part II: (Total 25 points)

9. How eukaryotic cells replicate their DNA ends? Please draw the model. Telomere sequence is 5' (TTAGGG)_n 3'. (10 points)
10. Please use a model to show how DNA replication proceeds. In the model, please show origin, leading strand, lagging strand, primers, Okazaki fragments. (10 points)
11. During DNA replication, what enzyme activity is used to remove RNA primers? (5 points)

Part III: (Total 40 points)

12. Use *trp* operon to describe the gene regulation in *E. coli* (repressor, attenuation). (8 points)
13. Activation of eukaryotic transcription depends on relief from repression imposed by chromatin structure. Describe three kinds of Histone-modifying enzymes and their effects on chromatin remodeling. (6 points)
14. What is the role of Shine-Dalgarno sequence during translation in *E. coli*? (2 points) How is it recognized? (3 points)
15. What is the function of lysosome? (3 points) How do cytoplasmic components delivered to lysosome? (3 points)
16. What is the committed step for cholesterol synthesis? (2 points) How is it regulated? (3 points)
17. Describe the roles of ATP in metabolism. (5 points)
18. Describe the role of GTPase activity of Rab5 in intracellular vesicle transport. (2 points) How is the activity of Rab5 regulated? (3 points)