

※ 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 : 50%

一、選擇題 (單選 2 分、複選 3 分；複選題有加註；作答時請標示題號) (共 23 分)

1. 一段雙股 DNA 共有幾個可能的 reading frame ?

- (A) 1
- (B) 3
- (C) 6

2. 一些需送至細胞外、細胞膜或送至 lysosome 分解之 protein 其運送次序為：

- (A) ER → *Cis* Golgi → *Trans* Golgi
- (B) *Cis* Golgi → *Trans* Golgi → ER
- (C) ER → *Trans* Golgi → *Cis* Golgi (ER=endoplasmic reticulum)

3. *E. coli* 之 DNA $\begin{array}{c} \text{CH}_3 \\ | \\ \text{—G—} \\ \text{—T—} \end{array}$ 經過修補後會成為 (A) —A— (B) —G—
—T— —T— —C—

4. 下列反應位置在真核細胞之 (A) 核質 (B) 核仁 (C) 細胞質

(請於答案紙標示題號 4-1, 4-2, 4-3, 4-4；單選二分)

- 4-1 : ribosome assemble _____
- 4-2 : tRNA processing _____
- 4-3 : mRNA processing _____
- 4-4 : translation _____

5. 下列何者可 transcribe 成 RNA ? (複選)

- (A) satellite DNA
- (B) rRNA gene
- (C) telomere sequence
- (D) pseudogene
- (E) Alu element

6. 下列何種 cell cycle 為 4N genome? (複選)

- (A) G0
- (B) G1
- (C) early S
- (D) late S
- (E) G2
- (F) M

7. Eukaryotic protein 常有 phosphorylation 的情形，下列哪些胺基酸為其 target site? (複選)

- (A) Serine
- (B) Proline
- (C) Threonine
- (D) Tyrosine
- (E) Tryptophan

二、解釋名詞 (一題 3 分；共 12 分)

1. N-linked glycoprotein (what amino acid and sugar are involved)
2. Telomerase (describe the enzyme function and steps involved)
3. Topoisomerase (describe the property of the two major classes)
4. Phosphofructokinase (describe the enzyme function)

三、問答題 (每題 3 分，共 15 分)

你在 identify 了一段 DNA sequence 後，要如何：(需簡述其過程)

1. 增量此 DNA sequence?
2. 確定哪一段 sequences 具有 promoter activity?
3. 確定這段 putative gene sequences 之 exon-intron junction?
4. 判斷此 DNA sequence 是否在細胞中有表達成 mRNA?
5. 判斷此 DNA sequence 是否在細胞中有表達成 protein?

Part II : 50%

一、選擇題：每題 4 分，共 44 分

1. In the physiological condition (pH=7), which of following amino acid has no charge?
 - (A) Aspartate
 - (B) Glutamate
 - (C) Histidine
 - (D) Glutamine

2. Which of the following process mostly correlates with gene inactivation?
 - (A) DNA methylation
 - (B) DNA acetylation
 - (C) Gene rearrangement
 - (D) DNA recombination.

3. Which of the following is correct to describe chromosome constituents?
 - (A) nucleosome is the smaller than histone.
 - (B) chromosome is larger than chromatin
 - (C) histone has the same size as chromatin
 - (D) chromatin is smaller than nucleosome.

4. Which of the following acts with DNA sequences that are upstream of the start site of transcription?
 - (A) RNA polymerase
 - (B) Primase
 - (C) Helicase
 - (D) none of above

5. Which of the following is not correct?
 - (A) Proline is not common in α -helices.
 - (B) Glycine is favor for β -turn.
 - (C) Arginine tends to stabilize the helix.
 - (D) Glutamates could destabilize the helix

6. Which of the following pairs is critical for glutathione reduction?
 - (A) pyruvate/succinate
 - (B) fumarate/succinate
 - (C) succinate/ malate
 - (D) NAD/NADH

7. The P450 belongs to which of following family?

- (A) Catalase
- (B) Oxygenase
- (C) Peroxidase
- (D) dehydrogenase

8. Which of the following is correct?

- (A) Hydroxyurea inhibits Ribonucleotide reductase
- (B) 5-fluorouracil inhibits Thymidylate synthase
- (C) allopurinol inhibits Xanthine oxidase
- (D) all are correct

9. Which of the following is correct?

- (A) pyrimidine metabolism is associate with uric acid production
- (B) Overproduction of purines result in hyperuricemia
- (C) Uric acid is the beginning substrate of purine degradation
- (D) all are correct

10. Which of the following tissue metabolize glucose, fatty acids for ATP production?

- (A) Muscle
- (B) Brain
- (C) Liver
- (D) kidney

11. Which of the following is incorrect?

- (A) Prostaglandins are from arachidonic acid
- (B) Malonyl CoA is from acetyl CoA
- (C) arachidonic acid is from leukotrienes
- (D) Acetyl CoA cannot be used to synthesis glucose

二、簡答題：共 6 分

Please list 3 nonessential amino acids and 3 essential amino acids that belong to Glucogenic. (6 分)