

系所組別： 藥理學研究所

考試科目： 生物化學

考試日期： 0308 · 節次： 1

※ 考生請注意：本試題 可 不可 使用計算機

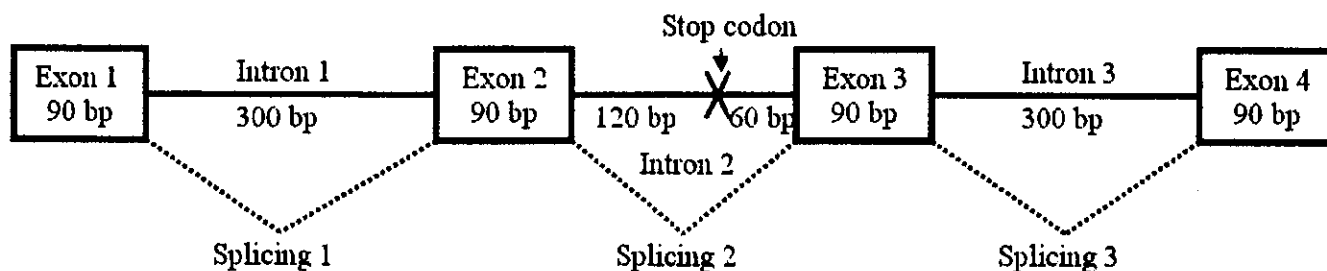
**Part I: 50%**

**一、解釋名詞 (一題 3 分；共 30 分)**

1. N-linked glycoprotein (what amino acid and sugar are involved)
2. Glycogenolysis
3. Signal peptide
4. Phosphofructokinase (describe the enzyme function)
5. Abortive initiation vs. Promoter clearance (during transcription)
6. Suppressor tRNA
7. Telomerase (describe the enzyme function and steps involved)
8. Topoisomerase (describe the property of the two major classes)
9. UvrABC excinuclease (describe the enzyme function and steps involved)
10. Polymerase chain reaction (describe steps and enzymes involved)

**二、問答題：(共 20 分)**

1. 下列一段 Pre-mRNA 序列在進行 (A) splicing 1 + 2 + 3 或 (B) splicing 1 + 3 後，其
  - (1) spliced RNA 的鹼基數目？(4 分)
  - (2) 再進行 translation 之後，請分別計算出 splicing (A) 及 (B) 情形下其 polypeptide 中會有幾個 amino acid？(4 分)
  - (3) 何者為 default splicing？(2 分)



(背面仍有題目,請繼續作答)

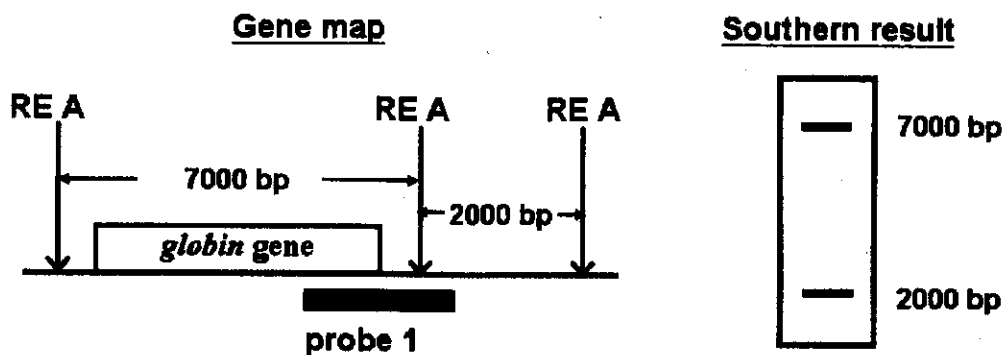
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2. 正常人類的 hemoglobin 之 *globin gene* 約為 7000bp 長，今以 restriction enzyme A (RE A) 水解後，用 probe 1 進行 Southern blot hybridization 得到圖示結果：



今有三個患者：甲、乙、丙，萃取其 genomic DNA 後進行上述 Southern blot hybridization，其結果如下：

甲：9000 bp

乙：6000 bp、2000 bp 及 1000 bp

丙：6000 bp 及 2000 bp

(1) 請畫出甲、乙、丙患者之 Gene map，並說明發生什麼突變 (6分)

(2) 說明製作 probe 1 的至少二種方法 (4分)

## Part II : 50%

### 簡答題：

1. Identify each of the lipoproteins described below. (Choose from **chylomicrons**, **VLDL**, **LDL**, and **HDL**) (5%)

A. Which lipoprotein has the highest density? Why?

B. Which lipoprotein carries the highest percentage of cholesterol and cholesteryl esters?

C. Which lipoprotein has the highest percentage of protein?

D. Which lipoprotein has the highest percentage of triacylglycerol?

E. Which lipoprotein removes cholesterol from circulation?

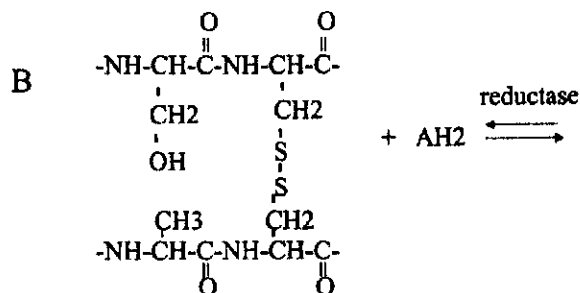
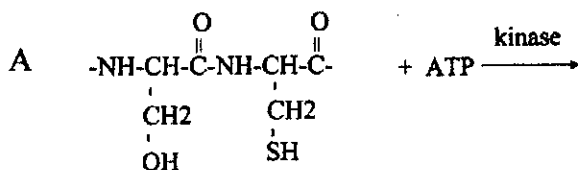
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2. Which of the following molecules are in the lipid family of compounds? (5 %)

- A. 1-Decanol
- B. Alanine
- C. Palmitic acid
- D. Trimyristin
- E. Glycerol
- F.  $\beta$ -Carotene
- G. Aspartame
- H. Ubiquinone

3. Bacteriorhodopsin, a protein found in the membrane of a salt-loving bacterium, has seven distinct regions of  $\alpha$ -helix. These regions span the cell membrane in the organism. Can you make any conclusions about the amino acid composition in these  $\alpha$ -helix regions of bacteriorhodopsin? (5 %)

4 Complete the following reactions that represent modes of regulation by covalent modification of amino acid residues. Assume that the amino acids shown are internal residues in a regulatory enzyme. (5 %)



5. In an experiment completed in biochemistry laboratory, you found that a 10 mM solution of the enzyme acetylcholinesterase catalyzed the breakdown of 0.5 M acetylcholine in 1 min of reaction time. Calculate the turnover number for acetylcholinesterase in  $\text{second}^{-1}$ . (5 %)

(背面仍有題目,請繼續作答)

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6. Draw the structure of butanoic acid as it would exist under the following conditions.  
(3 %)

- A. pH 1.0
- B. pH 7.0
- C. pH 12.0

7. Each of the following reagents or experimental conditions is capable of disrupting covalent and/or noncovalent bonding in a protein. List the type of bonding broken by each. (7 %)

- A. Heat at 60°C
- B. HCl + H<sub>2</sub>O; heat at 100 °C
- C. Ethyl alcohol
- D. Urea
- E. Sodium dodecyl sulfate.
- F. Acetone
- G. Mercaptoethanol

8. Predict the mode of transport for each of the following molecules through the erythrocyte plasma membrane. (Choose from **simple diffusion**, **passive-facilitated diffusion**, or **active transport**). (7 %)

- A. Phenylalanine
- B. Lactose
- C. H<sub>2</sub>O
- D. CO<sub>2</sub>
- E. Cl<sup>-1</sup>
- F. K<sup>+</sup>
- G. Glucose

9. Estimate the number of amino acids in each protein below (MW=molecular weight)  
(4 %)

Insulin, MW=5733

Immunoglobulin G, MW=145,000

10. Give a brief definition for each of the following terms. (4 %)

- A. Amphipathic
- B. Integral proteins