※ 注意：請於試卷上依序作答，並應註明作答之大題及小題題號。

一、

1. 何謂「Edman degradation」？請「繪圖」及配合「文字敘述」說明其過程，並請回答它的應用性何在？(10 分)

2. 純化蛋白質的方法有哪些？試列舉之。(15 分)

二、以下題目請標明題號，詳細作答。

1. 請以 *E. coli* 基因為例，說明：
   (1) 轉錄 (transcription) 如何啟始 (initiate)？(4 分)
   (2) 進行轉譯 (translation) 時，ribosome 如何決定轉譯起始點？(3 分)

2. 解釋名詞: (每題 2 分)
   (1) Antiterminator
   (2) DNA photolyase
   (3) Expressed sequence tag (EST)
   (4) Insertion sequence (IS)
   (5) microRNA (miRNA)
   (6) Origin of *E. coli* DNA replication
   (7) Reverse transcriptase
   (8) Telomerase
   (9) TFIID

三、

1. 按順序寫出所 Glycolysis preparatory phase 相關之方程式，並寫出其 net equation. (12%)
2. Pyruvate 代謝成 Aetyl-CoA 時，需經 ① Complex 來進行，此 complex 由 ② (E1)，③ (E2)和 ④ (E3) enzyme 構成 (4%)。
3. 寫出純化題(2) 中 enzyme complex 之方法，並設計一方法來選殖 E3 基因 (14%)。

見背面

四、Basic techniques for study of biochemistry (20 pts)

1. Protein-protein interaction is a key mechanism of biochemistry. Which methods as shown below are suitably used for this purpose? (10 pts)

2. The identity of a protein is critical in biochemistry. Please find the best five methods as list below for this validation. (10pts).

Listed experimental methods for the above questions

a--western blotting analysis
b--two dimensional gel electrophoresis
c--mass spectrometry
d--circular dichroism
e--footprinting
f--FRET (Fluorescence Resonance Energy Transfer)
g--ion-exchange chromatography
h--GST pull down
i--NMR (Nuclear Magnetic Resonance)
j-- high-performance liquid chromatography (HPLC)
k--X-ray crystallography
l--confocal microscopy
m--co-immunoprecipitation (Co-IP)
n--RT-PCR (reverse transcription-PCR)
o--real-time PCR
p--enzyme-linked immunosorbent assay (ELISA)
q--yeast two-hybrid
r--5'RACE (5'-rapid RFLP (Restriction Fragment Length Polymorphisms)
s--FISH (Fluorescent in situ hybridization)
t--affinity chromatography
u--Edman degradation reaction