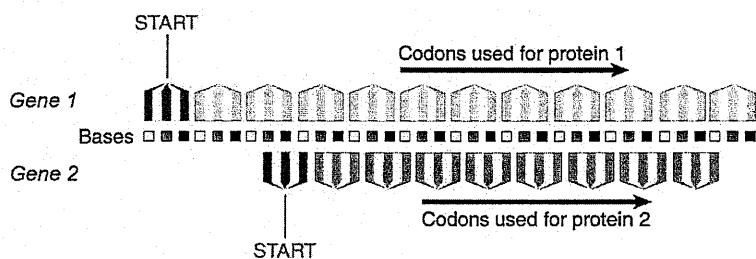


※ 考生請注意：本試題不可使用計算機。請於答案卷(卡)作答，於本試題紙上作答者，不予計分。

1. Discuss the rationales and the applications of targeted and untargeted next-generation sequencing (NGS) in microbiome research. (12 points)
2. Explain the definitions of microbiota (4 points), metagenome (4 points) and microbiome (4 points).
3. Discuss the mechanism of thermogenesis and what is the role of mitochondria in this important physiological process? (10 points)
4. Discuss the mechanism of unfolded protein response (UPR). (6 points)
5. Below is an example of overlapping gene, please describe the definition of overlapping gene and the difference between these two protein/polypeptide products. (4 points)



6. Describe the regulatory mechanism of trp operon (5 points) and its regulation by Attenuation. (3 points)
7. Describe the physiological significance of the regulation of Transferrin mRNA stability by intracellular iron level. (5 分)
8. Describe the biogenesis (5 分) and functions (3 分) of miRNA.
9. What are noncoding RNAs and how they work? (5 分)
10. Please write down the name and function of four kinds of noncoding RNAs (12 分：挑 4 種寫即可，每個名字 1 分，功能 2 分)
11. Please describe the mechanism of two types of tumor immunotherapy (10 分，名稱 1 分，機制 4 分)
12. Please describe the mechanism of following four types of intercellular signaling. (8 分，每種 2 分)
 - a. contact-dependent signaling
 - b. paracrine signaling
 - c. synaptic signaling
 - d. endocrine signaling