

※ 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. All DNA molecules move in the same direction when electrophoresed. In this generally true of proteins also? Explain. (5)
2. A restriction digest of a particular DNA produced by EcoRI always yields five fragments. In one experiment, an extra fragment, which is quite faint and migrates more slowly than all of the other bands, is seen. How might you explain this fragment? (5)
3. A single-stranded RNA virus contains 22% C. Is it possible to predict the percentage A in this nucleic acid? (5)
4. What's a plasmid? (5)
5. What is a telomere? Why do eukaryotes need telomeres? (5)
6. What is the SOS response in *E. coli*? (5)
7. How are the transcriptions controlled in a prokaryotic cell? (5)
8. What is alternative splicing, and why is it important? (5)
9. Explain a general mechanism for how antibiotics inhibit translation and how they specifically target bacterial cells. (5)
10. Explain a major difference between site-specific recombination and transposition (5)
11. Explain why the recombination events occurred more frequently around the *Chi* site in *E. coli*? (5)
12. What is a missense mutation? (5)
13. Please describe the connection of the three terms 'Silencing', 'Genomic imprinting', and 'Epigenetics'. (15)
14. Please describe the organization of the CRISPR (Clustered Regularly Interspaced Short Palindromic Repeats) locus and how CRISPR-Cas systems in bacteria and archaea function for adaptive defense and regulation. (25)