國立中央大學八十八學年度碩士班研究生入學試題卷

所別：生命科學研究所　不分組　科目：　分子生物學　共 1 頁　第 1 頁

請回答下列問題（共 100 分）

1. Suppose *E. coli* is growing in a growth medium containing lactose as the sole source of carbon. The genotype is $I^- Z^+ Y^+$. Glucose is then added. Which of the following will happen? (5%)
   (1) Nothing
   (2) Lactose will no longer be utilized by the cell.
   (3) The lac repressor will bind to the operator.
2. How many subunits are in *E. coli* RNA polymerase holoenzyme, and which one is responsible for correctly positioning the enzyme on a promoter? (5%)
3. What are RFLPs and how did they arise? (5%)
4. List three properties of an ideal cloning vector. (5%)
5. List two differences between prokaryotic and eukaryotic translation (ignore differences in ribosome structure). (5%)
6. What are the repressor and corepressor? (5%)
7. Two proteins are synthesized initially at the same time because the two RNAs encoding each protein are made in response to the same signal. At a later time, when the transcription signal is no longer present, one of the proteins is still made at nearly the same rate, and the other is not detected. Suggest a means for this temporal programming. (5%)
8. List two main mechanisms of mutation. (5%)
9. What noncovalent interactions are involved in maintaining the double-helical conformation of DNA? (5%)
10. What are the GU/AG rule and the Chargaff's rule?. (5%)
11. Outline the general differences between prokaryotic and eukaryotic mRNAs. (5%)
12. Two kinds of terminators have been found in *E. coli:* intrinsic terminator and rho-dependent terminator. What are the structural features of the intrinsic terminator? (5%)
13. Why is a lambda phage-created lysogen usually 'immune' against re-infection by another lambda phage? (5%)
14. How is the replication of the lagging strand accomplished. (5%)
15. Name the major enzymatic activity of DNA polymerase I, II, and III of *E. coli.* (10%).
16. What is the difference between conservative and replicative transposition? What base-sequence is duplicated in both types? (10%)
17. What is the difference between a genomic library and a cDNA library? Give an advantage of each type of clone. (10%)