

※ 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。
問答題

1. Please describe the function of sigma factors in bacterial transcription and how bacteria utilize the factors to control gene expression (10%).
2. Please describe the mechanisms of transcription termination in bacteria (10%).
3. Horizontal gene transfer (HGT) is a process by which bacteria obtain new genetic materials that their parent cells do not have. Therefore HGT is important for bacterial evolution. Please describe three mechanisms of HGT in bacteria (10%).
4. Describe the components of a gene control region of a typical eukaryotic gene, and briefly describe the functions of these components and factors associated with transcription initiation of a specific gene around the gene control region (12%).
5. Define RNAi and compare small interfering RNA (siRNA) and microRNA(miRNA) in structural property and activity of silencing gene expression (10%).
6. What is the CRISPR/Cas 9 system? What are applications of the CRISPR/Cas 9 system in eukaryotic cells (10%)?
7. Define the bidirectional mechanism of DNA replication (8%).
8. Please describe the definition of tumor suppressor gene (2%) and how to identify a gene as a tumor suppressor gene (5%).
9. Please compare translation mechanism and post-translational modifications of eukaryotic cells to that of prokaryotic cells (15%).
10. Please describe how the cells communicate with each other at molecular level (8%).