

1. Please describe why eukaryotes have larger genome size than the prokaryotes? (3%)
2. Please describe the differences between the replication and transcription? (6%)
3. Compare and Contrast the initiation process of "transcription" between prokaryotes and eukaryotes in detail. (13%)
4. Describe the mechanisms of the 5' capping and 3' poly-A in detail. And why are 5'-capping and 3'-poly-A important? (10%)
5. Explain the following terms:
 - (1) Rho-independent termination (2%):
 - (2) Codon degeneracy (3%):
 - (3) Wobble concept (3%):
 - (4) Suppressor mutation (2%):
 - (5) Self-splicing introns (2%):
 - (6) Alternative splicing (2%):
 - (7) Draw the structure of 4 nucleotides A, T, C, and G. (4%)
6. List the steps whereby miRNAs are generated and act to silence gene expression, and name the primary enzymes involved at each stage. (6%)
7. Compare and contrast the cut-and-paste mechanism of transposition with the replicative mechanism of transposition. (6%)
8. Histone codes, such as H3K9 or H3K27, are related to transcriptional regulation. Give two examples of the types of covalent modification to histones that influence gene expression. (6%)
9. (1) Explain the purpose of chromatin immunoprecipitation (ChIP) assay. (4%)
(2) A list of the steps for chromatin immunoprecipitation (ChIP) in the incorrect order follows. Provide the proper order for the steps of ChIP by listing the letter of each step. (4%)
 - a. Immunoprecipitation DNA-protein complex.
 - b. Amplify DNA by PCR.
 - c. Add antibody specific to one protein.
 - d. Cross-link proteins to DNA fragments.
 - e. Remove proteins.
10. Define the following terms: (24%)
 - (1) Operon
 - (2) Transcriptional antitermination
 - (3) Insulator
 - (4) Nonsense-mediated mRNA decay
 - (5) Heterochromatin protein 1 (HP1)
 - (6) Transposition target immunity
 - (7) Internal ribosome entry site (IRES)-mediated translation
 - (8) Riboswitch