

1. Please describe the major differences between prokaryotic and eukaryotic cells. (10%)
2. Please describe four common fat-soluble vitamins and their biological functions. (10%)
3. Please explain when a protein is denatured, it becomes less water-soluble and often precipitates from solution, and list four common agents used in the laboratory to carry out reversible denaturation. (10%)
4. Why is it logical for the first step in a metabolic sequence of reactions to be the major regulatory step? (5%) What is the first regulatory enzyme in TCA cycle and the reaction that is catalyzed by this enzyme in TCA cycle? (5%)
5. Please describe the molecular basis of separation in each of the following chromatographic techniques. (10%)
 - a. Ion-exchange chromatograph.
 - b. Affinity chromatography.
 - c. Gel filtration chromatography.
6. Please describe the molecular structure of nucleosome and its biological functions. (10%)
7. Please describe the general characteristics of DNA replication. (10%)
8. Please describe the main steps involving in posttranscriptional modification of primary messenger RNA maturation and their functions in protein synthesis. (10%)
9. Please describe the differences between prokaryotic and eukaryotic protein syntheses from gene level→RNA level→protein level. (10%)
10. Please describe details the molecular mechanisms of RNA interference (RNAi) and its potential applications in biomedical sciences. (10%)