1. Protein structure can be described in terms of four levels of organization. (1) Describe each level of protein structure. (2) Describe how each level of protein structure is maintained. **(20 分)**

2. Two-dimensional gel electrophoresis is a separation technique which uses isoelectric focusing in one dimension and SDS-polyacrylamide gel electrophoresis (SDS-PAGE) in the second dimension. Describe how this technique is used in protein purification and characterization. **(15 分)**

3. Enzymes are remarkably biochemical catalysts. Describe three distinctive features which enzymes have in common. **(15 分)**

4. The Michaelis-Menten equation $v = V_{max}[S]/(K_m + [S])$ describes that the initial rate (v) of an enzyme-catalyzed reaction is determined by two constants (V_{max} and K_m) and the initial concentration of substrate ([S]). **(20 分)**
(1) What is the major assumption used in the derivation of the Michaelis-Menten equation?
(2) Describe the importance of V_{max} and K_m in enzyme kinetics
(3) Describe how to determine the values of V_{max} and K_m more accurately
(4) Can the Michaelis-Menten equation be applied to allosteric enzymes? Explain.

5. Each class of biomolecules has a variety of functions. Describe any two functions of (1) proteins, (2) carbohydrates, and (3) lipids with specific examples. **(15 分)**

6. Metabolism serves two different purposes: the generation of energy and the synthesis of biological molecules. To achieve these purposes, metabolism consists largely of two contrasting processes: catabolism and anabolism. Compare and contrast catabolism and anabolism. **(15 分)**