系所組別：生物醫學工程學系丙、丁組

考試科目：生物化學 考試日期：0222，節次：2

※ 考生請注意：本試題不可使用計算機

1. Enzyme-linked immunosorbent assay (ELISA) has become an important clinical method to analyze the biomarkers, please express it in detail and then describe its problems in practical use? (10%)
2. Please describe how cells obtain energy from food in detail? (10%)
3. What are the glycoproteins and proteoglycans？ (10%)
4. An enzymatic reaction is represented as (10%)

$$E + S \rightleftarrows ES \rightarrow E + P$$

The concentration of enzyme-substrate complex [ES] is assumed at steady state throughout the reaction. Please derive an equation to express the reaction rate.

5. Please draw the oligopeptide (with underline) structure described as followed:
   (a) L-valinyl-glycyl-L-serinyl-L-alanine. (5%)
   (b) the RGD sequence of fibronectin that is the site of cell attachment via α5β1 and αVβ3 integrins on the cell surface. (5%)
6. Please describe what is "Chemiluminescence" and give an example to explain how it can be used in biotechnology. (10%)
7. What is the structure of mitochondria and describe its function in the cell?(10%)
8. Please give examples to explain what they are and what is the importance of coenzyme and cofactor, respectively? (10%)
9. Hemoglobin and myoglobin are oxygen-binding proteins, please describe their roles and the cooperation in our body. (10%)
10. Please explain the following technology and their applications: (2x 5=10%)
    (1) Fluorescence resonance energy transfer
    (2) Buffer solution