本試題是否可以使用計算機： ☑可使用 ， □不可使用 （請命題老師勾選）

※考生答題注意事項；請務必依題號順序於答案卷上作答，否則不予計分。

一、簡答與問答題，共八題，總分 100 分

1. Please write down the key words best defined by each description of the followings: **(30 分；每小題 3 分)**

   Note: Don't exceed three words in each description!

   a). The randomness or disorder of the components of a chemical system

   b). A type of macromolecules combining with lipids to form several classes of lipoprotein particles, spherical complexes with hydrophobic lipids in the core and hydrophilic amino acid side chains at the surface.

   c). The type of processing reactions altering some newly made proteins, both prokaryotic and eukaryotic, to attain their final biologically active conformations.

   d). The effect of pH and CO_2 concentration on the binding and release of oxygen by hemoglobin

   e). A sensitive diagnostic biochemical measurement on blood and urine samples which is essential in the diagnosis and treatment of diabetes. For example, the patient fasts overnight, then drinks a test dose of 100 g of glucose dissolved in a glass of water. The blood glucose concentration is measured before the test dose and at 30 min intervals for several hours thereafter.

   f). A system of flat membranous vesicles surrounding each myofibril.

   g). Isomeric forms of monosaccharides that differ only in their configuration about the hemiacetal or hemiketal carbon atom.

   h). A glucose derivative with oxidation of the carbon at the C-6 of glucose.

   i). A cloning technique can be used not only to overproduce proteins but to produce protein products subtly altered from their native forms in that specific amino acids may be replaced individually.

   j). A sophisticated genetic approach (technique) to defining protein-protein interactions is based on the properties of the Gal4 protein (Gal4p), which activates transcription of certain genes in yeast

2. Please draw the Lineweaver-Burk plots to briefly describe the three types of reversible enzyme inhibitions. Use three different concentrations of inhibitor (including [I]=0) to indicate what the line-interception terms (values) on the 1/V0 axis and on the 1/[S] axis are and how Km and Vmax change their values (increased, decreased, or unchanged).

(背面仍有題目,請繼續作答)

(a) Competitive inhibition; **(3分)** (b) Non-competitive inhibition; **(3分)** (c) Un-competitive inhibition **(4分)**.

3. In a laboratory experiment you completed a study of enzyme kinetics. The following data were collected:

Substrate concentration [S] (umolar)	50	120	300	500	800	1300	1800	2500
Velocity of Enzymatic reaction (umolar/min)	30	87	110	130	170	208	215	210

a). Estimate the Km for this substrate:enzyme combination without graphing the data. **(5 分)**

b). When add an inhibitor with fixed concentration to the enzymatic reaction, the velocity (umolar/min) of the reaction became: 46, 85, 99, 110, 120, 135, 148, 150. What is the function of this inhibitor? **(5 分)**

4. Please briefly **describe and compare the differences of** the genomics and proteomics and **give each one example** of the most commonly exercised analysis technique. **(10 分)**

5. A certain bacterial mRNA is known to represent only one gene and to contain about 800 nucleotides. If you assume that the average amino acid residue contributes 110 Dalton (Da) to the peptide molecular weight, about how much kDa of molecular weight would the largest polypeptide that this mRNA could code for be (show how you come up with this number)? **(10 分)**

6. Hydrolysis of 1 M glucose 6-phosphate catalyzed by glucose 6-phosphatase is 99% complete at equilibrium (i.e., only 1% of the substrate remains). How much would the G'° (free-energy change; KJ/mol) be? [$G'^{\circ} = -RT\ln Keq$; $R = 8.315$ J/mol·K; $T = 298$ K; log 100= 2, ln 100= 4.6, log 0.01= -2, and ln 0.01= -4.6] (show how you come up with this number) **(10 分)**

7. What are the **two** products from the substrate, phosphatidylinositol 4,5-bisphosphate, the hormone-activated phospholipase C could convert to? **(10 分)**

8. What are RFLPs (abbreviated from what genetic phenomenon?) and how are they used in forensic DNA fingerprinting technology? **(10 分)**