

※ 考生請注意：本試題不可使用計算機。請於答案卷(卡)作答，於本試題紙上作答者，不予計分。

1. Enzyme-linked immunosorbent assay (ELISA) has been used as a point of care in home health nursing and clinical diagnosis. Three types of them including direct ELISA, sandwich ELISA, competitive ELISA, had been developed in the last decades. Please express the detection theory of them, respectively. Furthermore, explain "Pregnancy test kit (驗孕棒)" in detail. (10%)
2. Please describe how cells obtain energy from polysaccharides in detail? (10%)
3. Ebola hemorrhagic (出血性的) fever caused a big damage in the West Africa area; please express why such a kind of virus infection caused Ebola mortality rate over 70%. (10%)
4. Please describe the structure of Mitochondria and its major functions. (10%)
5. Please draw the oligopeptide (with underline only) structure described as followed:
  - (a) Glutathione (ECG, a tripeptide) is converted to its oxidized form, glutathione disulfide (GSSG), please draw the structure of GSSG. (5%)
  - (b) The RGD sequence of fibronectin that is the site of cell attachment via  $\alpha 5\beta 1$  and  $\alpha V\beta 3$  integrins on the cell surface. (5%)
6. Please explain what is "Fluorescence" in theoretical and give an example to show how it can be usefully used in biotechnology. (10%)
7. Please illustrate and point out the structure difference between Gram positive bacteria and Gram negative bacteria. (10%)
8. NAD(H) is an important coenzyme of dehydrogenase functionalized in the TCA cycle, please give an example to describe their reaction and its application in diagnostics. (10%)
9. Hemoglobin and myoglobin are oxygen-binding proteins; please describe their roles and the cooperation in our body. (10%)
10. Please give an example or more to explain the following: (2x 5=10%)
  - (1) Essential amino acids (5%)
  - (2) Iron-sulfur proteins (5%)