

※ 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. Yellow fever (黃熱病) is an acute viral disease and caused by the yellow fever virus which is spread by the bite of an infected female mosquito. As a new comer determines to step into the biomedical engineering field, please make an effort to give an example and describe what the mosquito-borne infection disease is? (10%)
2. Please (1) explain what the unessential amino acid is? (5%)  
(2) draw the structures of the amino acids shown as followed: (2% $\times$ 5=10%)
  - (a) tyrosine (酪胺酸);
  - (b) leucine (白胺酸);
  - (c) glutamine (麩胺醯酸);
  - (d) histidine (組胺酸);
  - (e) alanine (丙胺酸).
3. Enzyme-linked immunosorbent assay (ELISA) has been used as a point of care test (POCT). 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 and their merits and drawbacks in detail. (15%)
4. What is isoelectric point (pI) and then give an example to explain. (10%)
5. Please describe the mechanism of immunotherapy in detail. (10%)
6. 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%)
7. Please explain the glycolysis. (10%)
8. Please express
  - (1) ultraviolet-visible spectroscopy. (5%)
  - (2) This method is most often used in a quantitative way to determine concentrations of an absorbing species in solution by using the Beer-Lambert law. Please explain it also. (5%)
9. Please explain and distinguish what is (1) real time PCR (5%) and (2) RT-PCR? (5%)