

※ 考生請注意：本試題不可使用計算機。~~請於答卷中作答，於本試題紙上作答者，不予計分。~~

1. “流感疫情急升溫 疾管署：公費疫苗病毒株猜錯了” 2018 年 1 月 2 日在各大報刊出。就一位已具生醫相關背景者，請表達相關知識並對這類疫苗的產品陳述意見。(10%)
2. (1) Please translate the below description into Chinese.
Sickle cell anemia (鎌刀狀紅血球貧血症) is a disease caused by an abnormality in the shape of one of the subunits of the hemoglobin protein. In the β -chain, the sixth amino acid, glutamate (麩胺酸), which is polar acidic, is replaced by valine, a nonpolar amino acid (also called by $\beta 6\text{Glu} \rightarrow \text{Val}$). This substitution creates a hydrophobic spot on the outside of the protein that sticks to the hydrophobic region of an adjacent hemoglobin molecule's beta chain. This further causes clumping (叢，團塊) of sickle hemoglobin (HbS) molecules into rigid fibers and then clog (堵塞) the capillaries. (10%)
(2) Please draw the structure for the peptides of Sickled β -chain and give its one-letter abbreviations and Chinese name shown as followed. (10%)
Sickled β -chain: Val - His - Leu - Thr - Pro - Val - Glu - Lys -
3. Express the reaction mechanism of lateral flow-based Pregnancy test kit (驗孕棒) (10%)
4. (1) Write an equation that represents an enzyme-catalyzed reaction. (4%)
(2) What type of reaction is catalyzed by oxidoreductase, transferase and hydrolase? (6%)
5. Please draw the primary structure of RNA, A, C, G, and U are connected by 3', 5' phosphodiester linkages. (10%)
6. NAD(H) is an important coenzyme of dehydrogenase functionalized in the TCA cycle, please give an example to express their reactions and how to be used to evaluate in the enzyme activity. (10%)
7. Viruses are small particles of 3 to 200 genes that cannot replicate without a host cell. Please describe (1) why they are unable to replicate on their own, and (2) the mechanism of the replication. (5%), (5%)
8. Lipids include Fatty acids and Steroids. Please show
(1) Some functions of lipids in the body, and (2) what is Triacylglycerol? (5%), (5%)
9. Please explain and distinguish what is (1) real time PCR, and (2) RT-PCR? (5%), (5%)