

※ 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. Plasma membrane constitutes the boundary between a living cell and its environment. Extracellular matrix is an organized network of extracellular materials present beyond the immediate vicinity of the plasma membrane.
 - a). Collagens comprise a family of fibrous glycoproteins that are present only in extracellular matrix. A number of the collagens, including type I, II and III, are fibrillar collagens. Type IV collagen is one of the nonfibrillar collagens. What are the differences between type I and type IV collagen? (10 pt)
 - b). What is the most important family of receptors that attach cells to their extracellular microenvironment? How can these receptor proteins influence the transmembrane signal transduction? (15 pt)
2. What is nucleotide excision repair? (10 pt) What is base excision repair? (10 pt) Could these two DNA repair systems complement each other's function? (5 pt)
3. What is the receptor tyrosine kinase? What is the role of Ras in this signaling pathway? What is the difference between Ras and a heterotrimeric G protein? (20 pt)
4. What is the major histocompatibility complex (MHC)? Please elaborate on its role in antigen presentation. (15 pt)
5. Please explain the following terms: (5 pt, each)
 - a). DNA polymerase 3' to 5' exonuclease activity
 - b). Th1 cytokines
 - c). Transposons