1. 試述補體（Complement）的活化路徑及其功能。(10 分)

2. 試就病原、參與作用的細胞與功效比較抗體免疫與細胞免疫反應。(10 分)

3. 何謂超級抗原與 T-cell independent antigen？(10 分)

4. 試述 NK 細胞（Natural Killer cells）如何對抗腫瘤或變性細胞。(10 分)

5. 試述免疫反應在 Gut-brain axis 中所扮演的角色。(10 分)

6. Please define the following: (5 points each)
   a. MHC restriction
   b. Thymic selection
   c. Recombination signal sequences
   d. Peyer's patches
   e. $\gamma\delta$ T cells

7. 試說明何謂 DNA 疫苗，其與傳統疫苗的差異以及其優缺點為何？(5 分)
(Please explain what is DNA vaccine? And what's the difference, advantage and drawback of DNA vaccine compare with conventional vaccine. (5 points))

8. 何謂佐劑 Adjuvant? 其功能與免疫機轉為何？(5 分)
(Please explain what is adjuvant? What are the immune mechanisms of adjuvant? (5 points))

9. 試說明裸鼠 nude mice 的免疫機能那些發生缺陷？這種動物模式可以用於那些免疫學上的研究？(5 分)
(Please explain what is the immune deficient mechanisms of nude mice? And what's the immunology research should use nude mice model? (5 points))

10. 請說明何者為第四型過敏反應？並舉出這個機轉在免疫上的應用？(5 分)
(Please explain what is the type IV hypersensitive reaction? And give a practical example? (5 points))

11. 請說明基因剔除鼠(gene knockout; KO)是如何產生的？(5 分)
(Please explain what is a knockout mouse? And how to produce a knockout mice? (5 points))

**試題隨卷繳回**