

# 國立成功大學

## 112學年度碩士班招生考試試題

編 號： 271

系 所： 微生物及免疫學研究所

科 目： 微生物學

日 期： 0207

節 次： 第 3 節

備 註： 不可使用計算機

※ 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。

**Virology section:**

1. Coronavirus disease (COVID-19) is a global viral disease caused by severe acute respiratory syndrome coronavirus 2 (SARS-CoV-2). During the pandemic, viral infections are diagnosed by several different methods. Please describe the method and virological principles underlying the (1) nucleic acid detection, (2) antigen detection, and (3) neutralizing antibody titer analysis for COVID-19 (12%), and when/for what purpose these tests are applicable (3%).
2. From November 2002 to July 2003, SARS-CoV caused the SARS epidemic in southern China and spread to 29 countries, leading to approximately 8,000 infections and 774 deaths. SARS-CoV is genetically similar to SARS-CoV-2, but these two viruses caused global epidemics on vastly different scales. Please describe (1) the similarities and differences in the virological characteristics of these two viruses (5%), and (2) possible reasons for the outbreak scale difference (5%).
3. Antigenic mutation and reassortment can generate novel influenza virus strains. Several avian influenza viruses (e.g., H5N1 and H7N9) have acquired their human infectivity through these processes. Please describe (1) the mechanism of influenza virus reassortment (5%), and (2) how reassortment leads to novel virus strains with human infectivity (5%).
4. If you suspect that a monkeypox virus (MPV) variant may have increased infectivity in humans due to increased interactions between virus D8L protein and an A protein in human cells, please design two experiments to prove it (15%).

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**Bacteriology section:**

5. There are many kinds of normal flora (the microbiota) in different part of human body (for example: gut, skin...). Please make 1-2 examples how these microbiota be beneficial for human beings? (10%)
  
6. Bacteria might cause disease through direct invasion or through toxin production. Please make 1-2 examples of the pathogenesis of these bacterial toxins. (10%)
  
7. Bacteria might develop antibiotics resistance. Please describe 1-2 examples of brief mechanism of antibiotics resistance; and the influence of theses resistance. (10%)
  
8. If you develop a new antibiotic, how to test the bacteria-killing effect of this new drug? (10%)
  
9. How to do "Gram stain" of bacteria? What is the meaning of gram-positive or gram-negative bacteria? (10%)