國立成功大學

113學年度碩士班招生考試試題

編　號：311

系　所：臨床醫學研究所

科　目：分子生物學

日　期：0202

節　次：第 3 節

備　註：不可使用計算機

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※ 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。

I. The 2023 Nobel Prize in Physiology or Medicine was jointly awarded to Katalin Karikó and Drew Weissman for their groundbreaking discoveries related to nucleoside base modifications. These modifications played a pivotal role in the development of highly effective mRNA vaccines against COVID-19. Discuss the significance and impact of their work on biomedical research and the field of mRNA vaccines. (10%) Provide a concise explanation of the potential mechanisms of SARS-CoV-2 infection, elucidating how the virus enters human cells and replicates. Additionally, describe a specific method for detecting SARS-CoV-2. (15%)

II. Please briefly describe what is CRISPR/Cas9 technology, and its application in molecular biology. (10 %)

III. Please describe what is "cell therapy" and give two examples of their potential application and limitation in human diseases. (10 %)

IV. Measuring cell proliferation can be performed using various methods, each with varying levels of sensitivity, reproducibility, and compatibility with high-throughput formatting. Please briefly describe three different methods. (15%)

V. Please briefly describe the following terms. (20 %)
   1. Autophagy
   2. Apoptosis
   3. Exosome
   4. Autocrine
   5. iPSC

VI. Please briefly describe the following terms. (20 %)
   1. Enzyme-linked immunosorbent assay (ELISA)
   2. Western blot
   3. Real time PCR
   4. Fluorescence-activated cell sorting (FACS)
   5. Next Generation Sequencing (NGS)