國立成功大學

112學年度碩士班招生考試試題

編　號： 317

系　所： 臨床醫學研究所

科　目： 分子生物學

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。

1. Please explain how DNA polymerase controls the fidelity of DNA replication. (5 %)

2. Please describe what is "alternative splicing" in RNA processing. (5 %)

3. Please explain why translations of mammalian proteins always start with the same amino acid. And which amino acid it is. (5 %)

4. What is "inducible expression" vector? What benefit of using it in producing recombinant proteins (5 %)

5. What are the normal biological functions of proto-oncogenes? Please describe the possible genetic changes that can turn proto-oncogenes into oncogenes. Give an example to explain why oncogenes can cause cancer. (10 %)

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

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

8. Western Blotting result depends on the entire system including antigen content, the sensitivity of primary and secondary antibodies, the sensitivity of substrate, the efficiency of color development, and photographic fixing. Please provide the troubleshooting to solve the following unsatisfactory results:
   (a) No signal or weak signal (5 %)
   (b) Non-specific bands (5%)

9. In late December 2019, multiple atypical pneumonia cases resulted in severe acute respiratory syndrome caused by a pathogen identified as a novel coronavirus SARS-CoV-2. Please briefly describe the possible mechanisms of infection by SARS-CoV-2, including how it enters human cells and replicates itself. Give an example method of how to detect SARS-CoV-2. (15 %)

10. Please briefly describe the following terms. (25 %)
    (1) NETosis
    (2) Non-coding RNAs
    (3) Exosome
    (4) Autocrine
    (5) 5'-UTR