編號： 271

國立成功大學 109 學年度碩士班招生考試試題

系　　所：生物化學暨分子生物學研究所

考試科目：分子生物學

考試日期：0211，節次：2

※ 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。

一、問答題（100 分）

1. Please describe in detail the post-transcriptional modification (or processing) of mRNA synthesis in eukaryotic genes. (10%)

2. Please compare and describe in detail the translational elongation of protein synthesis between prokaryotic and eukaryotic mRNAs. (10%)

3. Please describe in detail the role and function of eukaryotic translation factors resemble to prokaryotic translation factors IF3, EF-Ts, EF-G and RF3. (10%)

4. Please first define a bacterial operon and then describe the structure and regulation of *trp* operon. (10%)

5. Please first define a riboswitch and then describe the function and regulation of thiamine pyrophosphate (TPP) riboswitch. (10%)

6. In DNA replication, what regulations and processes ensure the new synthesized DNA is replicated correctly (10%)? Please describe.

7. What are the following RNA molecules: “tRNA”, “mRNA”, “rRNA”, “miRNA”, “siRNA”, and “miRNA”? Please describe each of them, and how each of them are generated in the cell (12%).

8. Please describe the role and mechanistic function of the following terms in gene expression: “restriction enzyme”, “enhancer”, “transcription factor”, “nucleosome remodeling”, “reverse transcriptase”, “transposon” (12%).

9. Assume that you have a next-generation sequencing machine in your lab bench and it works well. It is a powerful detector that can report DNA sequences generated by your experiments. Instead of conventional whole genome sequencing, what molecular biology experiments would/could you do to obtain samples for the instrument to read and report? Please describe 2 experiments, principle of experiment, and the purpose/objective of each experiment (16%).