編號： 64

國立成功大學 105 學年度碩士班招生考試試題

系　　所：生命科學系

考試科目：分子生物學

考試日期：0228，節次：3

※ 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、選擇題: (10 分，每題 2.5 分)

1. Who demonstrated that phage genetic material is DNA and not protein? (a) Chargaff, (b) Hershey and Chase, (c) Franklin, (d) Waston and Crick, (e) Avery, MacLeod, and McCarty

2. Who proposed that in any DNA molecule, A=T and G=C? (a) Hershey and Chase, (b) Franklin, (c) Chargaff, (d) Waston and Crick

3. A researcher identified a new enzyme and is interested in determining the mRNA expression pattern of this gene. Which of the following techniques would accomplish this goal? (a) Southern blot, (b) Western blot, (c) Eastern blot, (d) Northern blot

4. Which of the following types of information would be most useful in an effort to move a DNA fragment from one plasmid vector to another, using molecular cloning techniques? (a) restriction maps of the plasmids, (b) restriction fragment length polymorphism data, (c) sequence of PCR primers, (d) Southern blot data

二、問答題: (90 分)

1. Please describe RecABCD mediated **homologous recombination system** in *E. coli*, including the molecular function of RecABCD and RuvABC proteins (10%)

2. Please describe the **Mismatch repair system** in *E. coli* (10%)

3. Please describe in detail the **two transcription termination models in prokaryotic cells** (10%)

4. Please describe in detail the **spliceosome-mediated RNA splicing** (10%)

5. Please describe how the presence or absence of sugars **lactose** and **glucose** control the level of expression of the ***lac* genes** in *E. coli*. (15%)

6. Please write down 4 mechanisms that **transcription** of eukaryotic genes can be **repressed**. (20%)

7. Please draw a figure to show the generation of **siRNA** and **miRNA**, and their mode of action. (10%)

8. Please describe the terms "**systems biology**" and "**synthetic biology**". (5%)