元智大學 107 學年度 碩士班 招生試題卷

系(所)別：生物與醫學資訊 碩士學位學程　組別：不分組　科目：生物資訊概論　用紙第 1 頁共 1 頁

●不可使用電子計算機

1. (10%) Please describe the **central dogma of molecular biology** in eukaryotes and prokaryotes separately, and briefly explain their differences.

2. (30%) Please explain what are **tRNA** (5%), **rRNA** (5%), **mRNA** (5%), **miRNA** (5%), **lincRNA** (5%), and **circRNA** (5%).

3. (10%) Please explain what are **Next-Generation Sequencing (NGS)** and **Mass Spectrometry (MS)**.

4. (20%) Given a string S = GTCTAGTA, please construct (1) the **suffix tree** of S containing the suffix links (10%) and (2) the **suffix array** of S (10%).

5. (20%) Let S_1= TGGACTTACTA and S_2= AAGGACTA and let the scores of match, mismatch and gap penalty be 1, -1, and -2, respectively. Please finish the following table used in the **dynamic programming** algorithm for computing the **local alignment** of S_1 and S_2 (10%), and enumerate the **best local alignment** between S_1 and S_2 (10%).

Local	S_1	T	G	G	A	C	T	T	A	C	T	A
S_2	0											
A												
A												
G												
G												
A												
C												
T												
A												

6. (10%) Please explain how to construct the **microRNA regulatory network** based on next-generation sequencing data.