國立嘉義大學 100 學年度

微生物免疫與生物藥學系碩士班（乙組）招生考試試題

科目：分子生物學

1. A research assistant performed a total RNA extraction from eukaryotic cells, and the RNA was quantitated by spectrophotometric method. One microliter of total RNA stock was used to make 100 μl working solution for this measurement. Data from spectrophotometry displayed as followed:

   OD_{260} = 0.54; OD_{260}/OD_{280} (the ratio of OD_{260} to OD_{280}) = 1.78

   Please calculate the concentration of RNA stock. If the RNA stock volume is 200 μl, how much yield of RNA will be obtained? (10分) In addition, how do you evaluate RNA quality of this RNA preparation based on the data? (5分)

2. Compare the similarities and differences of silencing mechanisms between siRNA and miRNA, and delineate the distinct contributions of these two small regulatory RNAs to the fundamental biology and application, respectively (15分).

3. Define the following terms (A~C), and please explain how to apply it in biosciences or biotechnology.
   A. GFP reporter vector (5 分)
   B. Real-time PCR (5 分)
   C. Klenow fragment (5 分)

4. Please anwere the following questions related to DNA replication：
   A. How does DNA polymerase maintain the correct nucleotides in the replication? (5 分)
   B. Please give examples to explain the repair system to correct wrong bases in replication. (10 分)
   C. Why is the primer needed for DNA replication. (5 分)

5. Please list and describe at least two methods to do a DNA site-directed mutagenesis? (15 分)

6. If your professor wants you to find whether a human gene X can be induced under insulin treatment in transcriptional level. Please use cultured cells to design experiments and methods to demonstrate this hypothesis. (20 分)