

※ 考生請注意：本試題不可使用計算機

一、問答題：試題共 9 題，總分 100 分。

1. The Nobel Prize in Physiology or Medicine 2012 was awarded jointly to Sir John B. Gurdon and Shinya Yamanaka "for the discovery that mature cells can be reprogrammed to become pluripotent". Please describe in detail about the contributions of (1) Dr. Gurdon (2) Dr. Yamanaka. (10%)
2. You have identified the protein, X, which is associated with the 30S Initiation Complex in the intestinal cells in vivo. Therefore, you hypothesized that X may play roles in protein translation. To this end, please design at least four independent experiments to test your hypothesis. (20%)
3. Describe epigenetic regulation of gene expression in eucaryotes. (10%)
4. Describe the possible function of non-coding RNA in eucaryotes. (10%)
5. What is metabolomics? (10%)
6. Describe the mechanism of RNA polymerase II transcription in eucaryotes. (10%)
7. Please first compare the differences between both eukaryotic and prokaryotic mRNAs, and then describe the initiation processes in translation of an eukaryotic mRNA. (10%)
8. Please first describe the processes of aminoacylation of tRNA in eukaryotic cells and then define the meanings of aminoacyl-tRNA, peptidyl-tRNA and deacylated tRNA. (10%)
9. Please first define the nonsense mediated mRNA decay (NMD) mechanism and then draw a typical molecular structure and name the structural elements of an eukaryotic mRNA containing a premature translation-termination codon (PTC) that induces the NMD mechanism. (10%)