本試題是否可以使用計算機： □可使用 ，☑不可使用 （請命題老師勾選）

Please answer <u>all</u> the questions <u>in order</u>.

1. Describe: **a.** the difference between missence and nonsense mutation; **b.** the function of EF-Tu in the process of translation. (10%)

2. **a.** Define the following terms: Restriction fragment length polymorphism (RFLP); Single nucleotide polymorphism (SNP); Minisatellite? (5%)
   b. How RFLP, SNP and Minisatellite are used for genetic mapping? (10%)

3. **a.** Define micro RNA ; **b.** describe the mechanism it functions in the cell; **c.** list the application of micro RNA in research. (15%)

4. List three essential features for a DNA molecule to exist as a linear chromosome in the eukaryotic cell. (10%)

5. The lac operon is an operon required for the transport and metabolism of lactose in *Escherichia coli* and some other enteric bacteria. François Jacob and Jacques Monod started to study the lac operon by asking 'how does *E. coli* control certain genes in response to metabolic needs?' They got the <u>Nobel Prize in Physiology or Medicine</u> 1965 for their discoveries concerning genetic control. What is the basic structure of *lac* operon (10%). Describe the key idea of F. Jacob and J. Monod and the way they translated this idea into doable experiments (20%).

6. Compare the advantage and the disadvantage (any putative limitation) of following techniques: Reverse Transcription-Polymerase Chain Reaction (RT-PCR), Northern blot analysis, and Western blot analysis in studying a given gene X in *E. coli* (15%).

7. List five high impact (e.g. Impact Factor >5) international journals publishing scientific findings on "Molecular Biology" (5%).