考生注意事項：所有考題務必在答案卷上作答，在問題卷上作答者不計分。

1. Describe the role of the following terms in eucaryotic transcriptional regulation: (1) nuclear matrix, (2) scaffold attachment region (SAR), (3) histone acetylation, (4) DNAse I hypersensitive sites (5) nucleosome positioning. (15 %)

2. Describe the role of (1) cyclin D (2) retinoblastoma protein (3) p16 inhibitor (4) E2F transcription factor (5) cyclin E in the regulation of cell cycle progression (15%)

3. Eucaryotic cellular proteins sometimes can change the intracellular localization in response to outside stimuli, for example, bax can move from nucleus to mitochondria during stress. Give TWO examples of intracellular protein movement between different organelles and explain their significances. (10%).

4. Please draw the general structures of plasmid, prokaryotic and eukaryotic chromosomes and describe the important or functional elements in plasmid, prokaryotic and eukaryotic chromosomes. (10%)

5. Explain why the DNA polymerase cannot completely replicate the ends of eukaryotic chromosomes and describe the molecular mechanism that is used for maintaining the ends of eukaryotic chromosomes, and the biological implications of the ends of eukaryotic chromosomes. (10%)

6. Please describe the properties and transposition mechanisms of transposable elements (transposons), and the applications of transposable elements in functional genomics studies. (10%)

7. How are the functions of a bacterial *lac* repressor and a mammalian glucocorticoid receptor similar ? How are they different (10%)?

8. Transcription of a class II gene starts at a guanosine 30bp downstream of the first base of the TATA box. You delete 10 bp of DNA between this guanosine and the TATA box and transfect cells with this mutated DNA. Will transcription still start at the same guanosine ? If not, where(10%) ?

9. A researcher purified large quantities of a specific protein from mesquite bean extractsand asked for help to develop two independent cDNA screening strategies using structurebased approaches (independent on protein function). Briefly describe two screening strategies beginning with the purified protein. Assume the appropriate cDNA libraries are available (10%).