

試題共十題，總分 100 分。請依題號順序於答案卷作答；未依序作答者不予計分。

1. Please (a) list all the inducible systems in eukaryotic cells available so far and (b) compare their advantages and disadvantages. (10%)
2. Hypoxia (low oxygen tension) is common in physiological and pathological conditions, which is also an important stimulus for gene expression. Please (a) describe how gene expression is regulated by hypoxia, and (b) list all the conditions related to hypoxia. (10%)
3. Please describe in detail how tryptophan biosynthesis is regulated in *E. coli*. (10%)
4. Describe the regulation of translation initiation in eucaryotic cells. (10%)
5. Expression and purification of recombinant protein in various organisms provides the basis of modern biotechnology. Compare the advantages and disadvantages of expressing recombinant exogenous proteins in *E. coli* and mammalian cells. (10%)
6. Explain following terms in transcriptional regulation of eukaryotic cells: (1) histone acetylation, (2) transcriptional coactivator, (3) general transcription factors, (4) DNA methylation, (5) chromatin remodeling complex. (10%)
7. Describe the process of DNA replication system in eukaryotic cells. (10%)
8. Please describe the function of *E. coli* DNA polymerase I and III in DNA replication, and the general processes of prokaryotic DNA replication. (10%)
9. Please describe the formation of aminoacyl-tRNA, and the general processes of prokaryotic protein translation. (10%)
10. Please describe the processes of protein degradation by ubiquitination and proteasome mechanism, and the possible biological function of sumolation mechanism. (10%)