模拟题

1 Explain the following concepts (each 4 points, total 32 points)

Heterochromatin

异染色质：a tightly packed form of DNA or condensed DNA, and is considered to be largely inert genetically

Origin of replication(Ori)

复制起始位点：a particular sequence in a genome at which replication is initiated

Restriction endonuclease

限制性内切酶：an enzyme that can cleave the DNA into manageable fragments at particular sites within a molecule

Western Blotting

蛋白质印迹法：an analytical technique used to detect specific proteins in a given sample of tissue homogenate or extract

Genome

基因组：the entirety of an organism’s hereditary information

Trans-acting factor

反式作用因子：proteins which can recognize and bind to cis-acting elements to regulate the transcription

DNA packing

DNA 包装：DNA wound around histones form the nucleosome, which is a fundamental repeating unit of eukaryotic chromatin.

Differential expression

差异表达：a genomic phenomenon that an organism wouldn’t express all genes all the time, only a set of genes is expressed all the time, and the others are expressed only when they are needed.

2 选择题 (each 3 points, total 42 points)

3 Answer or expound the following question (26 points)

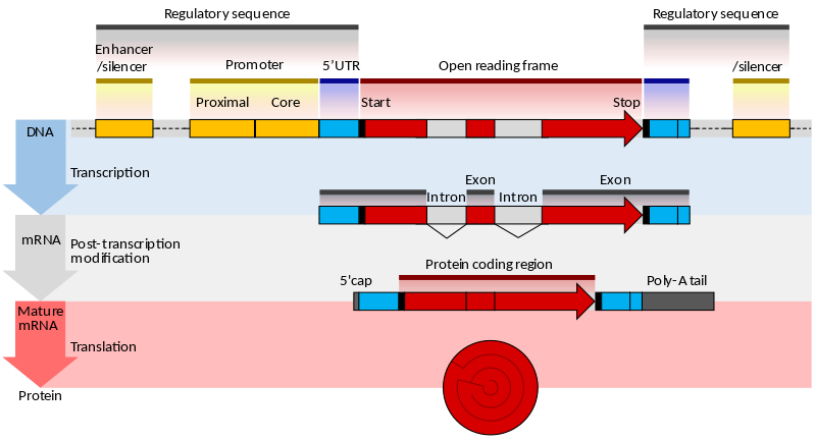
1. Explain the three concepts, exon intron and gene. What’s general features(basic structure)of gene?(You may illustrate it by using a figure) (7 points)

   exon: the expressed parts of DNA sequence

   intron: the intervening, “junk DNA”, not expressed

   gene: a segment of DNA on a chromatin that codes for a specific protein thus determines a trait

   the structure of eukaryotic protein-coding gene :



2. What is the RNA processing.(6 points)

   RNA processing includes:

   1) Capping on the 5′ end of the RNA
   2) Splicing of the introns(most complicated)
   3) Polyadenylation on the 3′ end of the RNA

3. How many types of Eukaryotic RNA Polymerases, and what′ s their respective functions?(6 points)

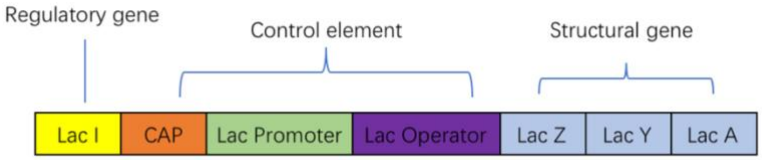
   3 types.

Polymerase	Products
Polymerase Ⅰ	rRNAs; 28S, 18S and 5.8S
Polymerase Ⅱ	mRNAs, some small RNAs
Polymerase Ⅲ	tRNAs and 5S, additional small RNAs.

4. What is an operon? Sketch out an example and label the various components making up the operon. List down their respective functions.(7 points)

   Operon is a unit of prokaryotic gene expression and regulation which typically includes:structural genes, control elements and regulator genes.

   Lac operon component :



   Function :

   Lac Z : codes for β-galactosidase

   Lac Y : codes for lactose permease

   Lac A : codes for thiogalactoside transacetylase

   Lac operator : bound by repressor to regulate gene expression

   Lac promoter : bind to RNAP, initiate transcription

   CAP binding site : bind to catabolite gene activator protein

   Lac I : codes for lac repressor, which can bind to lac operator and obstruct RNAP from binding to lac promoter