

I. 單選題 (每題 2 分, 共 30 分)

1. What name is the condition of the mitochondrial origin?
  - A. D loop
  - B.  $\alpha$  loop
  - C. rolling loop
  - D. linear loop
  
2. What region is found the satellite DNA?
  - A. euchromatin
  - B. heterochromatin
  - C. homochromatin
  - D. exchromatin
  
3. How many types of component show by the reassociation kinetics of eukaryotic DNA?
  - A. 2
  - B. 3
  - C. 4
  - D. 5
  
4. The coexistence of multiple alleles at a locus is called the \_\_\_\_\_.
  - A. genetic heteromorphism
  - B. genetic monomorphism
  - C. genetic polomorphism
  - D. genetic polymorphism
  
5. Following statements which one is true regarding DNA methylation:
  - A. DNA methylation usually increases gene expression.
  - B. DNA methylation usually decreases gene expression.
  - C. DNA methylation usually does not effect gene expression.
  - D. DNA methylation preferentially occurs in adenine nucleotide throughout the genome.

(背面仍有題目,請繼續作答)

6. DNA rearrangement in lymphocyte can:
  - A. create new antigen
  - B. create new antigen presenting cells
  - C. increase immune diversity
  - D. increase antibody production
  
7. Yeast Ty element is a retrotransposon:
  - A. It encodes a RNA polymerase.
  - B. Its transposition mediates through RNA intermediates.
  - C. It transpose into a specific target site.
  - D. It does not encode any proteins.
  
8. Activity of identical genes vary from cell to cell during development. This phenomenon is due to control of DNA \_\_\_\_\_ .
  - A. replication
  - B. transcription
  - C. translation
  - D. methylation
  
9. Three types of RNA involved in comprising the structural and functional core for protein synthesis, serving as a template for translation, and transporting amino acid, respectively, are:
  - A. mRNA, tRNA, rRNA
  - B. rRNA, tRNA, mRNA
  - C. rRNA, mRNA, tRNA
  - D. tRNA, mRNA, rRNA
  
10. RNAs that catalyze biological reactions, such as self-splicing introns, are known as:
  - A. spliceosomes
  - B. lariats
  - C. ribozymes
  - D. mature RNAs

11. Which of the following molecules serve to transfer information from the nucleus to the cytoplasm?
- A. DNA
  - B. mRNA
  - C. protein
  - D. lipids
12. Which one do not belong to stop codon:
- A. UAA
  - B. UGA
  - C. UAU
  - D. UGA
13. Which description is not correct regarding to p53:
- A. belongs to tumor suppressor gene
  - B. triggers apoptosis
  - C. regulate the p21 expression
  - D. induces cancer formation
14. We known that cyclic AMP serve as a second messenger in signal transduction, following which transcriptional factor could be activated through cAMP pathway?
- A. c-fos
  - B. CREB
  - C. Smad
  - D. NF- $\kappa$ B
15. What do the nuclear localization signal work during protein localization?; for sorting to:
- A. nuclear
  - B. cell surface of plasma membrane
  - C. ER
  - D. Golgi

II. 複選題 (每題 2 分, 全對才給分, 答錯不倒扣; 共 20 分)

1. What is the mechanism of DNA replication?
  - A. semidiscontinuous
  - B. primed by DNA
  - C. primed by RNA
  - D. semiconservation
  
2. What are the repeats that have been defined on the minimal origin?
  - A. 8-mer
  - B. 9-mer
  - C. 14-mer
  - D. 13-mer
  
3. What organelles have the genome?
  - A. mitochondria
  - B. chloroplast
  - C. ribosome
  - D. lysosome
  
4. What biological activities do bacterial RecA proteins involve?
  - A. DNA replication
  - B. DNA recombination
  - C. DNA repair
  - D. DNA transposition
  
5. Following descriptions which are correct?
  - A. A repressor molecule interacts with the protein molecule to inhibit DNA synthesis.
  - B. In eukaryotic cell, DNA can be modified by the methylation of its cytosine residues.
  - C. Methylation of DNA is correlated with expression of genes.
  - D. Positive gene control utilizes components such as hormones and special proteins to augment gene activity.

6. In an operon, following statements which are true?
- A. An operon may consist of promoter, regulator genes, structural genes.
  - B. Transcription of regulated by the interaction between cis-acting factors and trans-acting sites.
  - C. Bacterial structural gene clusters can be transcribed into a polycistronic mRNA from a single promoter.
  - D. A promoter serves to initiate transcription only of the gene or genes physically connected to it on the same stretch of DNA.
7. Promoters for eukaryotic mRNA synthesis:
- A. are more complex than prokaryotic promoters
  - B. require binding of multiple transcription factors to form a transcription complex
  - C. have specific DNA sequences such as the "TATA" box that are recognized by proteins
  - D. are the stretches of DNA to which RNA polymerase binds to initiate transcription
8. How many the triplet codon are coded for serine:
- A. AGU
  - B. AGC
  - C. UCA
  - D. UCC
9. Following which can be degraded by proteasome:
- A. enzyme
  - B. protein
  - C. nucleotide
  - D. ribosomal RNA
10. What general features occurs in apoptotic cell:
- A. DNA laddering
  - B. membrane blebbing
  - C. DNase activated
  - D. Bcl-2 expression

(背面仍有題目,請繼續作答)

## III. 簡答題 (每題 5 分, 共 50 分)

1. Please draw and explain the DNA replication on the adenovirus.
2. Please draw and explain the DNA replication on the phage X174RF.
3. Please draw and explain how expand or contract the gene cluster by unequal crossing-over.
4. What are the possible effects in gene expression caused by transposon if a transposon jumps to a gene in a genome?
5. Would you expect the tRNA and mRNA molecules to be the same in the cells of a pig as in the similar human cells? Why?
6. Eukaryotic mRNA must be processed before it is mature. What happen in RNA processing?
7. What is the difference between negative and positive control of gene expression?
8. Please describe the chaperones function why it is required in protein synthesis?
9. What are the protein serine/threonine kinases? What are their roles in biological function?
10. Please identify the c-oncogene and v-oncogene function.