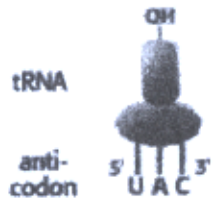
I. 單選題 (每題 2 分)

1. The primary RNA transcript of the chicken ovalbumin gene is 7700 nucleotides long, but the mature form mRNA that is translated on the ribosome is 1872 nucleotides long. This size difference occurs primarily as a result of:
   A. Capping
   B. Cleavage of polycistronic mRNA
   C. Removal of poly A tails
   D. Splicing

2. The "Southern" technique involves:
   A. The detection of RNA fragments on membranes by specific radioactive antibodies.
   B. The detection of proteins on membranes using a radioactive DNA probe.
   C. The detection of DNA fragments on membranes by a radioactive DNA probe
   D. The detection of proteins on membranes

3. With what mRNA codon would the tRNA in the diagram be able to form a codon-anticodon base pairing interaction?



   A. 3'-AUG-5'
   B. 3'-GUA-5'
   C. 3'-CAU-5'
   D. 3'-UAC-5'
   E. 3'-UAG-5'

4. In prokaryotes, the number of amino acids in the protein translated from a messenger RNA of a size of 336 nucleotides long, including the initiator and termination codons would be :
   A. 330
   B. 112
   C. 111
   D. 110

(背面仍有題目,請繼續作答)

5. The genetic code is _____.
   A. dinucleotides
   B. trinucleotides
   C. mononucleotides
   D. multinucleotides

6. What is the messenger RNA for template DNA: ATGCCGTTA?
   A. ATGCCGTTA
   B. AUGCCGUUA
   C. TACGGCAAT
   D. UACGGCAAU

7. The amount of human genome has about _____ nucleic acids?
   A. 10^6
   B. 10^7
   C. 10^8
   D. 10^9

8. What organelle did not contain genetic materials?
   A. nucleus
   B. mitochondrial
   C. lysosome
   D. chloroplast

9. What biological activities do bacterial RecA proteins involve?
   A. DNA replication
   B. DNA repair
   C. DNA transcription
   D. DNA transposition

10. UV can commonly cause what type of DNA damage:
   A. DNA intrastrand pyrimidine dimer
   B. DNA alkylation
   C. DNA depurination
   D. DNA transposition

11. In the heterochromatin region of a chromosome:
    A. DNA transcription is more active
    B. DNA transcription is less active
    C. Chromosome structure is loose
    D. DNA recombination is not occurred

12. Phage lambda DNA can integrate into bacteria host genome as well as excised from host genome:
    A. Integration requires proteins only from phage.
    B. Excision requires proteins only from phage.
    C. Integration and excision require proteins from phage as well as bacteria.
    D. Integration can occur anywhere in bacterial genome.

13. Which of the following stage is not one of the three stage of protein synthesis?
    A. Initiation
    B. Elongation
    C. Termination
    D. Glycosylation

14. The phases of the cell cycle are controlled by discrete events that happen during G1, at S phase, and at mitosis, but which stage is not enter the cell cycle progression?
    A. G2 phase
    B. G0 phase
    C. M phase
    D. All not

15. Oncogenes may code for secreted proteins, transmembrane proteins, cytoplasmic proteins and nuclear proteins, which protein is not belong to nuclear protein that plays a transcription factor function?
    A. c-myc
    B. c-fos
    C. c-rel
    D. c-sis

(背面仍有題目,請繼續作答)

II. 複選題 (每題 2 分)

1. Which statements are true about nucleic acid hybridization?
   A. It depends on complementary base pairing
   B. A DNA strand can hybridize with another DNA strand
   C. An RNA strand can hybridize with a DNA strand
   D. Double strand DNA denatures at high temperature

2. Which of the following features would you expect to be found in the heterogeneous nuclear RNA (hnRNA)?
   A. Intron
   B. 5-' "cap" structure
   C. poly adenylation at 3'-end
   D. polycistronic coding
   E. U nucleotides

3. What is the mechanism of DNA replication in the phage X174?
   A. Semidiscontinuous
   B. Nicking with A protein
   C. Nicking on (-) strand
   D. Rolling circle replication

4. What are the components of core enzyme on DNA polymerase III?
   A. α
   B. β
   C. ε
   D. θ

5. Following statements which are true regarding DNA recombination:
   A. DNA recombination can increase genetic diversity.
   B. Homologous DNA recombination required homologous DNA sequence.
   C. DNA recombination is a spontaneous reaction without enzyme catalyzation.
   D. Site-specific DNA recombination is responsible for the integration of phage genomes into the bacterial chromosome.

6. An active transposon usually requires the following factors:
   A. Transposase
   B. Internal repeat element
   C. Terminal repeat element
   D. Specific target sites

7. What is the structure of nucleosome?
   A. It contains about 200 bp of DNA.
   B. It organized by an octamer of small, basic protein called histones.
   C. DNA lies on the surface of histone core particle.
   D. Histone core particle wrapped around the DNA.

8. Chaperone families have eukaryotic and bacterial counterparts, which of the following proteins belongs to the chaperone family member?
   A. Hsp70
   B. Hsp40
   C. GrpE
   D. Hsp10

9. Transforming viruses may carry oncogenes, which viruses contain oncogene?
   A. Polyoma virus
   B. HPV
   C. Adenovirus
   D. Retrovirus

10. Effectors for receptor tyrosine kinase include phospholipases and kinases that act on lipids to generate second messengers, which products have a second messenger function?
   A. DAG
   B. IP3
   C. PLC
   D. PIP2

III. 簡答題 (每題 5 分)

1. You might transform a vector with a suppressor gene into a temperature sensitive mutant of yeast to repress its temperature sensitivity, why do some high copy suppressors of a temperature sensitive mutant work, whereas a low copy vector carrying the same gene cannot?

2 What specific role might methylation play in the control of eukaryotic gene expression?

(背面仍有題目,請繼續作答)

3. Bacterial RNA polymerase has two modes of termination. Please briefly describe them.

4. Please draw and explain the DNA replication of a mitochondria

5. Please draw and explain what the minimal required component of *E. coli oriC*.

6. How do you distinguish transposon from retrotransposon?

7. What is the structure of antibody? Why plasma cell can produce so many varieties of antibodies?

8. What is the function of a stop codon during protein translation? How many stop codons have been founded?

9. How do proteins enter and leave membranes after protein synthesis, please described them in detail?

10. What is programmed cell death? And what well known death pathways are be characterized such as caspase-dependent or p53-dependent pathway, please described them in detail?