參考用

一、單選題 (75%; 2.5 points each)

1. Which of the following scientists was the first to describe transposon?
A. Mendel; B. Morgan; C. McClintock; D. Miescher; E. Avery

2. Which of the following enzymes can destroy the RNA in a solution?
A. ribonuclease; B. trypsin; C. ATPase; D. deoxyribonuclease; E. Kinase.

3. Which of following codons would not be recognized as a stop coden for translation?
A. AUG; B. UAG; C. UAA; D. UGA; E. none of the choices are correct.

4. Which of following sequences is a palindrome?
A. GAATTC; B. CTGACT; C. ATCCTC; D. GGCCAA; E. CCTTTC

5. All of the following descriptions is gene participates in activities conditions **except**
A. A gene is repository of genetic information; B. A gene can be replicated; C. A gene can accept occasional changes, or mutation; D. Genes are fixed in their position on a chromosome. E. Genes could also be turned on or off due to certain environmental conditions.

6. Which of following descriptions is **not** correct for transcription?
A. DNA as a template; B. Four ribonucleoside triphosphates as subtracts; C. DNA polymerase as enzyme; D. Phosphodiester bond in the product chain; E. the product growing chain in 5' to 3' direction.

7. Which of following descriptions is **not** correct?
A. The prokaryotic mRNA have a special sequence, called a Shine-Dalgarno sequence; B. A protein called the cap-binding protein binds to the cap and then helps attract ribosome at eukaryotic mRNAs; C. The initiation codon interacts with a special aminoacyl-tRNA is N-formylmethionyl-tRNA in eukaryote; D. The enzyme call aminoacyl-tRNA synthetase that play a specific amino acid attach to a specific tRNA; E. The tRNA contains a 3-bp sequence that pairs with a complementary 3-bp sequence in an mRNA.

8. The cDNA is
A. circular DNA; B. complementary DNA; C. central DNA; D. cloned DNA; E. cut DNA.

注意：背面有試題

9. All of the following items are biological macromolecules **except**
A. Protein; B. Carbohydrate; C. Nucleic acid; D. Fats; E. Vitamin

10. Which of following descriptions is **not** correct for Mendel's laws of inheritance?
A. One allele can be dominant over the other, recessive, allele; B. If each parent carries two copies of a gene, the parents are diploid for that gene; C. A gene can exist in different forms called alleles; D. An organism that has two identical alleles for a gene is said to be homozygous for that gene; E. Sex cells, or gametes, are haploid, containing two copies of each gene.

11. Which of the following techniques is most useful to amplify a specific DNA fragment *in vitro*?
A. Southern analysis; B. DNA fingerprinting; C. Polymerase chain reaction; D. DNA sequencing; E. RACE

12. β-galactosidase cleaves the disaccharide lactose into _____ and _____.
A. glucose, galactose; B. glucose, fructose; C. galactose, fructose; D. galactose, galactose. E. glucose, glucose.

13. Which of the following statements is **not** true about the λ phage?
A. DNA circularization in *E.coli* by 12 base cos cohesive ends; B. The product of *cI* gene is λ repressor, which is important for lysogeny; C. The expression of *cro* gene must be stimulated during lysogeny; D. cIII is a protector of cII; E. *N* and *Q* genes must be turn on during lytic phase.

14. Which of the following statements is **not** true about histone?
A. The most common histone modification is methylation; B. Core histones contain H2A, H2B, H3, and H4; C. The DNA winding almost twice (1 and 3/4) around the core histones; D. Most of the histones are also well conserved from one organism to another; E. Histones are usually basic and have pronounced positive charge at neutral pH.

15. Heterochromain:
A. chromatin that is active; B. It is found at the telomeres; C. chromatin that is extended; D. accessible to RNA polymerase; E. contain most of the genes.

16. The following domains which can play DNA binding activity?

A. zinc fingers; B. prolin-rich regions; C. acid regions; D. coiled-coil domain; E.PRR domains.

17. The correct order of chromatin folding is
(1) nucleosome formation
(2) 30 nM fiber formation
(3) radial loop structure

A. 1, 2, 3; B. 3, 2, 1; C. 2, 1, 3; D. 2, 3, 1; E. 1, 3, 2.

18. The consensus sequence of splicing signal at the first two bases and the last two bases of pre-mRNA are
A. GG-AG; B. GU-AG; C. CU-CG; D. GU-AU; E.GA-CG.

19. Which of the following statements is **not** true about the TATA-box-binding protein (TBP)?
A. TFIID contains TBP and TBP-associated factors; B. Different TBP have been identified from yeast, fruit fly, plant, and human, and they are more than 80% identical in amino acid sequence; C. TBP binds in the minor, rather than the major, groove of DNA; D. The TBP functions not only in transcription of class II genes, but also in transcription of class I and class III genes; E. TBP has two known enzymatic activities, Histon acetyltransferase (HAT) and Kinase.

20. If a transposable element can transpose on its own because it contains
A. transposase; B. DNA repeats; C. origin of replication; D. antibiotic resistance; E. Tn10.

21. Which is correct order of following steps in translation elongation?
(1) EF-G, with GTP, translocates peptidyl-tRNA to the P site.
(2) EF-Tu, with GTP, binds an aminoacyl-tRNA to the ribosomal A site.
(3) Peptidyl transferase forms a peptide bond between the peptide in the P site and the newly arrived aminoacyl-tRNA in the A site.
A. 3, 1, 2; B. 3, 2, 1; C. 1, 2, 3; D. 1, 3, 2; E. 2, 3, 1.

22. Which of following proteins are **not** need in DNA replication fork during DNA replication?
A. Helicase; B, Single-strand DNA-binding proteins; C. Topoisomerase; D. DNA polymerase; E. recombinase.

23. All of the following agents causes DNA damage (mutagen) **except**
A. ampicillin; B. deaminating agents; C. sodium nitrite; D. ethylmethanesulfonate; E. ethidium bromide.

24. Which of the following enzymes can digest dsRNA and play a role in RNA interference?
A. Dicer; B. RNasin; C. Argonaute; D. RNase A; E. RNase P

25. Which of the following methods would you use to detect DNA and protein interaction *in vivo*? A. Electrophoretic mobility shift assay; B. Chromatin Immunoprecipitation; C. Yeast two-hybrid assay; D. Real time PCR; E. DNA sequencing.

26. Which of the following descriptions is **not** a function of the poly A tail of mRNAs?
A. protects the mRNA from degradation; B. enhances translatability of the mRNA; C. enhances transport of the mRNA to the cytoplasm; D. enhances splicing of the mRNA ; E. prevent expression of the mRNA.

27. Which of the following descriptions is **not** true for *Agrobacterium*-mediated transformation gene transformation.
A. It is a particularly useful in plants; B. Also called gene gun; C. Using a T-DNA plasmid to introduce a gene into plants; D. It is a natural genetic engineer. E. Also can transfer DNA into non-plant cells

28. Spliceosome contains several snRNPs. Which of the following description of each snRNP is **not** matched with its function?
A. U1: base pairs with 5' splice site of pre-mRNA; B. U2: base pairs with the conserved sequence at splicing branch point of pre-mRNA; C. U3: base pairs with 3' splice site of pre-mRNA; D. U4: Base pairs with U6; E. U5: associates with last nucleotide in one exon and the first nucleotide in the next exon.

29. Which is correct order of following stages in transcription initiation?
(1) Forming the open promoter complex.
(2) Forming the closed promoter complex.
(3) Promoter clearance.
(4) Incorporating first few nucleotides.

A. 1, 2, 3, 4; B. 1, 4, 3, 2; C. 2, 1, 4, 3; D. 1, 2, 4, 3; E. 3, 1, 2, 4.

參考用

30. Multiple forms of eukaryotic RNA polymerase. Which of the following description about the roles of eukaryotic RNA polymerases is **not** correct?
A. RNA polymerase I synthesize 18S rRNA; B. RNA polymerase II synthesize mRNAs; C. RNA polymerase synthesize tRNAs; D. RNA polymerase IV synthesize 5S rRNA;E. RNA-dependent RNA polymerase catalyzes the replication of RNA from an RNA template.

二、填充題 (25%; 2.5 points each)

A. All gene cloning experiments require such carrier, which we call vectors to allow replication of recombinant DNA. A typical vector contains three characteristics:___1___; ____2____; ____3_____.
B. List three post-transcriptional modification of mRNA: ___4___; ___5___; __6___.
C. DNA replication need enzymes to synthesize DNA. The enzyme which major responsible for bacterial DNA replication is ___7____.
D. A short (18-25) RNA produced naturally in cells that can control the expression of cellular genes by causing destruction of specific mRNAs, or blocking their translation is __8___.
E. ___9__ that strong stimulates transcription of a gene or genes, are usually found upstream of the genes they influence, but they can also function if inverted or moved hundred or even thousands of base pairs away.
F. __10____ is an enzyme that recognizes specific base sequences in DNA and cuts at or near those sites.