I. 選擇題 (單複選混合，每題答案正確才計分，共 20 題，每題 3 分，60%)
※ 注意：請於試卷上「選擇題作答區」依序作答。

1. Triplet representing stop codon are:
(A) UGA (B) UAG (C) UGU (D) UAC (E) UAA

2. The replication fork on the DNA below moves from left to right.
5'-ATGTGTGTGTGACGCTTTTTTTTTAAAAAAGTAGA-3' top
3'-TACACACACACTGAGAAAAAAAAAATTTTTTCATCT-5' bottom
Which strand is the template for leading strand synthesis?
(A) top (B) bottom (C) none

3. Method(s) to determine the relative quantity of RNA.
(A) Southern blot (B) Northern blot (C) Far-Western blot (D) RT-PCR (E) RNase protection assay

4. Which are DNA-binding domain
(A) Zinc finger (B) Helix-turn-helix (C) Helix-loop-helix (D) Leucine zippers (E) homeodomain

5. About protein trafficking, which are true?
(A) Oligosaccharides are added to proteins in the ER and Golgi.
(B) Membrane receptors recycle via endocytosis.
(C) Coated vesicles transport both exported and imported proteins.
(D) Protein localization depends on further signals.
(E) None of above

6. The PCR reaction mixture includes:
(A) DNA template (B) oligonucleotide primers (C) heat-stable DNA polymerase(D) DNA kinase
(E) all four deoxynucleoside triphosphates

7. DNA damage causes arrest of the cell cycle at
(A) G1 (B) G2 (C) S (D) M (E) none

8. mRNA identical in sequence with one strand of the DNA, this strand DNA can be called:
(A) sense strand (B) antisense strand (C) coding strand (D) template strand (E) noncoding strand

9. Tumor suppressor gene has the property of being:
(A) dominant (B) recessive (C) loss of function (D) gain of function (E) viral gene

10. The core proteins of a nucleosome consist of:

接背面

(A) H2A (B) H3B (C) H4 (D) H3 (E) H1

11. Which statements are true?
(A) The transcriptional start site of an mRNA can be determined by 5'RACE
(B) The transcriptional start site of an mRNA can be determined by primer extension assay
(C) The GST pulldown assay is used to examine protein-protein interaction
(D) DNA microarray is used to map gene location in the human genome
(E) DNase footprinting can be used to determine the specific DNA sequence bound by transcription factors.

12. To detect the spatial and temporal transcription pattern of a specific gene during tooth development:
(A) in situ hybridization (B) Western blot (C) Northern blot (D) exon trapping (E) cDNA library screen

13. According the wobble hypothesis, wobbling occurs because the conformation of the tRNA anticodon permits the flexibility at which base of the anticodon:
(A) first (B) second (C) third (D) fourth (E) second and third

14. Splice sites in pre-mRNA are marked by two universally conserved sequence locating:
(A) in the middle of the intron
(B)at the ends of the exons
(C) at the ends of the introns
(D) at the ends of transcripts
(E) none of above

15. Which of the following molecules can recognize specific mRNA sequence during bacterial translation?
(A) release factor (B) aminoacyl-tRNA synthetase (C) ribosomal protein (D) 16S ribosomal RNA
(E) charged amnioacyl-tRNA

16. About DNA polymerase I, which statements are correct?
(A) Klenow fragment has polymerase and 3'-5' exonuclease activities
(B) Klenow fragment has polymerase and 5'-3' exonuclease activities
(C) Small fragment has polymerase and 5'-3' exonuclease activities
(D) Small fragment has polymerase and 3'-5' exonuclease activities
(E) Small fragment has 5'-3' exonuclease activity

接次頁

17. In splicing reaction, U6snRNA can pair with:
(A) U1 (B) U2 (C) U3 (D) U4 (E) U5

18. You are going to express human globin gene in bacteria using an expression vector.
(A) The expression vector should contain the Kozak sequence for RNA polymerase binding.
(B) The expression vector should contain the Shine-Dalgarno sequence for ribosome binding.
(C) You need the cDNA but not the genomic DNA of the human globin gene for expression
(D) The cDNA should be inserted 3' downstream of the promoter of the expression vector
(E) The amino acid sequence of the bacterially expressed globin is different from that of the human globin due to different codon usage.

19. If you are interested in studying the promoter of a tooth gene in mouse, which of the following libraries can be used to isolate the promoter region?
(A) a mouse liver genomic library (B) a mouse tooth cDNA library (C) a mouse muscle cDNA library (D) a mouse brain expression library (E) none of above

20. RNA polymerase III transcribe
(A) mRNA (B) rRNA (C) small RNA (D) tRNA (E) none of above

II. 解釋名詞 (共 5 題，如有需要，可繪圖輔助說明，每題 3 分，15%)
1. Euchromatin and heterochromatin
2. 5'UTR and 3'UTR
3. Nonsense mutation and missense mutation
4. RFLP
5. Epigenetic

III. 問答題 (共 2 題，如有需要，可繪圖輔助說明，25%)
1. Nonsense suppressor tRNAs are generated by mutations in the anticodon. You find a point mutation as an amber suppressor in the Ser tRNA (that recognize the codon UCG). Please write down the anticodon sequence (label 5' and 3') of the suppressor tRNA and circle the mutated base. (5%)

2. 試述 (1)何謂 RNA 干擾現象 (RNA interference, RNAi) (2) RNAi 的作用機制？ (3) RNAi 在生物學及醫學研究上的應用及其方式。(20%)

試題隨卷繳回