

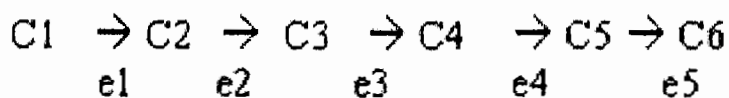
※ 考生請注意：本試題不可使用計算機。請於答案卷(卡)作答，於本試題紙上作答者，不予計分。

一、選擇題：（30分，每題2分）

1. Which of the following is a technique used for genomic functional profiling?
  - (a). DNA microchips
  - (b). RNAi analysis
  - (c). SAGE
  - (d). transcription activation
  - (e). RFLP
  
2. Which of the following is not a technique that can be used to study protein-protein interactions?
  - (a). 2-D gel electrophoresis
  - (b). protein microarrays
  - (c). immunoaffinity chromatography
  - (d). phage display
  - (e). yeast two-hybrid analysis
  
3. Which of the following statements is not true concerning homologous recombination?
  - (a). It can be intramolecular.
  - (b). It can be bimolecular.
  - (c). Only one cross-over event can occur.
  - (d). It results in genetic variation.
  - (e). It is a reciprocal event.
  
4. Which of the following techniques was key in demonstrating the presynapsis and synapsis steps of homologous recombination?
  - (a). S1 nuclease mapping
  - (b). exonuclease digestion
  - (c). DNA footprinting
  - (d). Southern Blot
  - (e). electron microscopy
  
5. Biochemical and genetic experiments have demonstrated that the \_\_\_\_\_ of tRNA are important for recognition by its cognate aminotransferase-tRNA synthetase.
  - (a). D loop and T loop
  - (b). T loop and variable loop
  - (c). anticodon loop and T loop
  - (d). acceptor stem and anticodon loop
  - (e). variable loop and D loop

(背面仍有題目，請繼續作答)

6. Please place the steps of translation elongation in the correct order.
- 1). Peptidyl transferase forms a peptide bond between the peptide in the P site and the newly arrived aminoacyl-tRNA in the A site.
  - 2). EF-G, with GTP, translocates peptidyl-tRNA to the P site.
  - 3). EF-Tu, with GTP, binds an aminoacyl-tRNA to the ribosomal A site.
- (a). 3, 1, 2  
(b). 3, 2, 1  
(c). 1, 2, 3  
(d). 1, 3, 2  
(e). 2, 3, 1
7. Which of the following antibiotics does not inhibit protein synthesis by binding to the ribosome?
- (a). chloroamphenicol
  - (b). streptomycin
  - (c). tetracycline
  - (d). erythromycin
  - (e). ampicillin
8. Which of the following RNAs is involved in mRNA editing?
- (a). rRNA
  - (b). tRNA
  - (c). gRNA
  - (d). snRNA
  - (e). iRNA
9. Which of the following processes occurs posttranscriptionally?
- (a). Cap addition
  - (b). adenosine deamination
  - (c). Poly(A) addition
  - (d). promoter clearance
  - (e). unwinding
10. In liver cells, the production of compound (6 C) is blocked by a defect in the enzyme e3:



- Which of the following is the best way to restore the production of C6?
- (a). Reduce the level of C1.
  - (b). Reduce the level of C3.
  - (c). Treat cells by supplying e4.
  - (d). Treat cells by supplying C4.
  - (e). Block the formation of C5.
11. A new mutant cell line was accidentally created in the lab. This mutant was found to be deficient in the enzyme aminacyl-tRNA synthetase. Which of the following would most likely be observed in this cell line?
- (a). No tRNA molecules would be present.
  - (b). tRNA molecules would contain no anticodons.
  - (c). Most tRNA molecules would not be able to attach to amino acids.
  - (d). Protein synthesis would increase.
  - (e). None of the choices are correct.
12. In which of the following scenarios is a silent mutation least likely?
- (a). change in a sequence in the 5' UTR
  - (b). change in a sequence the 3' UTR
  - (c). change in a sequence in an exon
  - (d). change in the sequence in the promoter
  - (e). change in a sequence in an intron
13. What is the RACE technique?
- (a). screening a genomic library
  - (b). extending incomplete cDNA sequences
  - (c). generating polynucleotide probes
  - (d). rapid amplification of genomic DNA
  - (e). screening a genomic library and generating polynucleotide probes
14. Which of the following is not true about run-on transcription assay?
- (a). Isolated nuclei are used in the assay.
  - (b). Cytoplasmic RNA is included in the assay.
  - (c). The reaction is done in the presence of labeled nucleotide.
  - (d). The assay can reveal the transcription rates of genes
  - (e). Genes being transcribed can be identified.

15. Which of the following statement is false regarding the sigma-factor in bacteria?

- (a). It does not have a DNA-binding domain.
- (b). Interaction with the core enzyme unmask the DNA-binding region.
- (c). Subregions 2 and 4 are involved in promoter recognition.
- (d). It can also bind to the nontemplate strand.
- (e). It can bind to the -10 box.

二、問答題（70分，每題10分）

16. Please first draw and name the molecular structure of a general mature eukaryotic mRNA, and then describe their functions in protein translation. (10%)
17. Please first compare the differences of translational initiation between prokaryotic and eukaryotic cells, and then describe the processes during translational initiation in eukaryotic cells. (10%)
18. Please first define the meanings of noncoding RNAs, and then describe two noncoding RNAs and their functions in eukaryotic cells. (10%)
19. Describe locus control region and chromatin remodeling machinery in RNA polymerase II transcription. (10%)
20. Describe important epigenetic markers and their effects on transcription in eucaryotic cells. (10%)
21. Describe three types of polymerase III transcription. (10%)
22. Describe important regulatory mechanisms in mRNA degradation. (10%)