

編號： 492 系所：分子醫學研究所

科目：分子生物學

本試題是否可以使用計算機：可使用，不可使用（請命題老師勾選）

## 一、選擇題：(60%)

1. RNA molecules that exhibit catalytic activity are called
  - a. mRNAs
  - b. ribonucleases
  - c. ribosomes
  - d. ribozymes
  - e. ribonucleotides
  
2. In the classical model of transcriptional control described by Jacob and Monod, a repressor protein binds to
  - a. an enhancer
  - b. an AUG sequences
  - c. an operator
  - d. a ribosome-binding site
  - e. a TATA box
  
3. Common lesions found in DNA after exposure to ultraviolet light are
  - a. pyrimidine dimmers
  - b. single strand breaks
  - c. base deletions
  - d. purine dimmers
  - e. transpositions
  
4. Which of the following is most likely to lead to a loss of gene function?
  - a. a missense mutation in the open reading frame
  - b. a change from a TAA codon to a TAG codon in the coding region
  - c. a change from T to C in the promoter region
  - d. a frameshift mutation in the coding region
  - e. a sequence change in the 3' untranslated region
  
5. Heat-shock proteins were originally described as proteins produced in response to heat stress. Some are now known to act as
  - a. molecular chaperones that regulate protein folding
  - b. protein-tyrosine kinases
  - c. proteases that degrade ubiquitin-tagged proteins
  - d. GTPase-activating proteins
  - e. Ionophores that dissipate H<sup>+</sup> gradients
  
6. Which of the following is NOT involved in the processing of mRNA precursors in eukaryotic cells?
  - a. capping of the 5' end
  - b. addition of poly A
  - c. excision of introns
  - d. splicing of exons
  - e. transport of the pre-mRNA to the cytoplasm
  
7. Which of the following is the most likely mechanism for the origin of multigene families?
  - a. endosymbiosis
  - b. gene duplication
  - c. convergent evolution of dissimilar genes
  - d. horizontal gene transfer
  - e. viral infection

(背面仍有題目,請繼續作答)

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8. Which of the following is NOT required for RecA-dependent recombination between two DNA molecules?
- strand migration
  - ligation
  - mismatch repair
  - nuclease digestion
  - DNA synthesis
9. A gene that has multiple phenotypic effects is
- polygenic
  - holandric
  - polymorphic
  - epistatic
  - pleiotropic
10. Which of the following does not play a role in DNA replication?
- DNA polymerase
  - helicase
  - single-stranded binding protein
  - guanyl transferase
11. Which of the following codons cannot be recognized by a tRNA molecule?
- UAA
  - CGA
  - UUU
  - AUG
12. Which of the following is not a characteristic of a tRNA molecule?
- D arm
  - Beta arm
  - T arm
  - Anti-codon arm
13. What signals the end of transcription?
- stop codon
  - terminator
  - the end of the DNA chain
  - RNA polymerase runs out
14. What is the function of the poly A tail?
- Helps with recognition by ribosomes during translation
  - Eases transportation from the cell nucleus to the cytoplasm
  - Prevents mutations
  - The function is unknown
15. What is the name of the molecule that is added to the 5' end of eukaryotic RNA transcripts?
- ATP
  - snRNP
  - GTP
  - Phosphate

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16. What is the sequence recognized by poly (A) polymerase?
- TATAAA
  - CAA
  - CCCGAA
  - AAUAAA
17. What is the name of the bond that links the nitrogen base and the ribose sugar in a nucleotide?
- Phosphodiester bond
  - 5'-5' bond
  - Glycosidic bond
  - Amide bond
18. What links codons and anti-codons together during DNA translation?
- DNA ligase
  - Single-stranded binding protein
  - Complementary base pairing
  - GTP
19. Virus-mediated transfer of cellular genetic material from one bacterial cell to another by means of virus particles is called
- induction
  - transfection
  - transformation
  - transcription
  - transduction
20. The ability of yeast to produce invertase, an enzyme necessary to metabolize sucrose, was abolished by either of two mutations, m-1 and m-2, that arose spontaneously in two separate yeast cultures. A heterozygote formed by mating m-1 mutant cells with m-2 mutant cells would be expected to restore the yeast's ability to produce invertase if m-1 and m-2 are
- mutations of two separate nonallelic genes
  - in the same complementation groups
  - identical alleles of the same suppressor
  - both temperature-sensitive mutations

## 二、問答題：(40%)

- The responsiveness of a cell to exposure to a growth factor are usually attenuated after a period of time (eg. half an hour), after which time it loses this responsiveness. What mechanisms might be employed by a cell to reduce its responsiveness to a growth factor? (10%)
- In light of the fact that DNA tumor virus must suppress the apoptosis of infected cells in order to multiply, what are the range of molecular strategies that are available to them to do so? (10%)
- Please write down the full name of RNAi, siRNA, miRNA. Please explain and compare their function. (10%)
- Please compare the essential factor in translation initiation between prokaryotes and eukaryotes. (10%)