一、選擇題 (30 分，每題 2 分)

1. 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

2. 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

3. The most common type of DNA damage repair is _____.

   A. excision repair.
   B. photoreactivation.
   C. suicide enzyme repair.
   D. DNA photolyase.
   E. proofreading repair.

4. Which of the following repair mechanisms is a damage bypass mechanism, not an actual repair mechanism?

   A. DNA photolyase
   B. base excision repair
   C. nonhomologous end joining
   D. mismatch repair
   E. recombination repair

5. 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

(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. The Shine-Dalgarno sequence can be found in _____.

A. mRNA.
B. tRNA.
C. 5S rRNA.
D. 16S rRNA.
E. 30S ribosome.

8. Picornavirus mRNAs are not capped, yet they can still out compete host mRNAs for binding to the ribosome by _____.

A. inactivating host Cap binding protein, eIF4F.
B. degrading host mRNA.
C. having a stronger affinity for the ribosome.
D. inactivation of host RNases.
E. inactivation of host Cap binding protein, eIF2B

9. The function of normally occurring mRNA deamination appears to be the proper

A. cleanup of the mRNA.
B. mRNA folding.
C. mRNA splicing.
D. mRNA modification.
E. protein synthesis.

10. Which of the following processes occurs post-transcriptionally?

A. Cap addition
B. adenosine deamination
C. Poly(A) addition
D. promoter clearance
E. unwinding

11. Please put the following steps of mRNA Cap synthesis in the correct order.

(1) N^7 of the capping guanine is methylated.
(2) The terminal phosphate is removed from the pre-mRNA.
(3) A capping GMP is added to the pre-mRNA.
(4) The 2′-O-methyl group of the penultimate nucleotide is methylated.

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

12. Which of the following is NOT a function of the mRNA Cap?

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. helps regulate expression of the mRNA

13. The Histone Code states that the _____.

A. primary sequence of the histone proteins never changes over time.
B. combination of histone modification on a given nucleosome near a gene's control region affects the efficiency of transcription of that gene.
C. combination of histone modification on a given nucleosome near a gene's control region affects the efficiency of transcription of all the nearby genes.
D. lysines are the only amino acids found in histones that can be acetylated and deacetylated.
E. histones are found in all living cells.

14. Which of the following histone proteins is the most highly conserved from one organism to another?

A. H1
B. H2A
C. H2B
D. H3
E. H4

15. Predict the effect of the addition of excess acetyltansferase to in vitro transcription assay.

A. It will likely loosen the interaction of histone with DNA.
B. It will lead to a tighter association of histone with DNA, resulting in reduced transcription.
C. It will have no effect on the interaction of DNA with histones.
D. There will be a complete repression of transcription.
E. None of the choices are correct.

(背面仍有題目,請繼續作答)

二、問答題（70分）

16. Explain the production and function of micro RNA. (10%)

17. The cyclooxygenase-2 mRNA level was elevated when Hela cells were treated with interleukin-1. Incubation of the Hela cells with actinomycin D could not abolish the upregulation of cyclooxygenase-2 mRNA by interleukin-1. To further investigate the mechanism of post-transcriptional regulation of cyclooxygenase-2 mRNA, describe the experimental approaches you would like to use. (10%)

18. Describe several modes of histone modification and function consequence in epigenetic regulation of eukaryotic cells. (10%)

19. Explain how RNA polymerase II and related transcription factor initiate RNA transcription in eucaryotes. (10%)

20. Please first describe the essential components and processes involved in ubiquitination and SUMOlation in eukaryotic proteins, and then explain the biological function of the ubiquitination and SUMOlation in eukaryotic cells. (10%)

21. Please first define the meaning of translational recoding and then describe three classes of translational recoding that are known. (10%)

22. Please first draw a typical molecular structure and name the structural elements of an eukaryotic mRNA and then describe the biological functions of the structural elements. (10%)