國立成功大學 104 學年度碩士班招生考試試題

系所組別：藥理學研究所

考試科目：生物化學

考試日期：0212，節次：1

※ 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。

Part I：50%

一、選擇題：40% (2 points each)

1. Which of the following is/are characteristics of lysosomal enzymes?

A) are protein synthases.

B) work at basic pH.

C) the enzyme contents of lysosome are preserved among different tissues.

D) disrupted lysosomal membrane causes cellular digestion.

E) None of them.

2. Which of following about restriction enzyme is correct?

A) Cleave RNA

B) Cleave non-specific sequence

C) Cleave site can be protected by sequence-specific methylation.

D) Was first found in the mice.

E) It only generates blunt-end after cleavage.

3. Which one does not have aromatic ring?

A) Tyrosine

B) Phenylalanine

C) Tryptophan

D) Histidine

4. What is/are the function of telomerase?

A) To separate parental strands

B) Usually add eight-nucleotide repeats

C) adding new nucleotides to the 3'-end DNA chain

D) it contains DNA as a template.

E) All of them.

5. What is/are required for polymerase chain reaction (PCR)?

A) DNA polymerase

B) Templates

C) Primers

D) 5'-dNTP

E) All of them

6. What is small inhibitory RNAs (siRNAs)?
A) It is single stranded
B) It inhibits DNA replication
C) It is required for DNA repair
D) It inhibits transcription
E) It requires ribosome.

7. What method is used to detect protein expression?
A) Northern blot
B) Western blot
C) Southern blot
D) Eastern blot
E) Real time-PCR

8. What is cDNA?
A) Complementary DNA
B) Commercial DNA
C) Conserved DNA
D) Chromosome DNA
E) Complete DNA

9. What is cell surface receptor?
A) After ligand binding it allows ion influx.
B) Also called GPCR
C) Required second messenger
D) Activates enzymatic cascade
E) Needs phosphorylation.

10. Which of following is correct about cell membrane?
A) Majority are triacylglycerol
B) Contains sucrose
C) Carbohydrate is conjugated with protein and lipid.
D) It is single layer
E) It contains about 95% phospholipid

11. Which of following may cause enzymic catalysis irreversible?
A) low temperature

B) increase enzyme concentration
C) accumulation of product
D) under equilibrium
E) reactants are less stable than products

12. The transporter within inner mitochondria membrane is for:
A) ATP
B) cAMP
C) NADH
D) Calcium
E) H_2O

13. Desaturation of fatty acids in human:
A) Occurs In endoplasmic reticulum
B) Occurs in mitochondria
C) Occurs in Golgi
D) After palmitate is elongated
E) Required CO_2

14. Which of following about acetyl-coA carboxylase is correct?
A) palmitoyl CoA activates its activity
B) Requires biotin
C) Activated by cAMP-mediated phosphorylation
D) It delays fatty acid synthesis
E) None of them

15. Which of the following is/are characteristics of hemoglobin?
A) Highly beta-sheet
B) One heme binds one O_2
C) Contains one chain and one oxygen binding site
D) In a hydrophilic pocket to interact with heme
E) It presents in the white blood cell.

16. Which of following about mitochondria is incorrect?
A) Contains their own genome
B) Contains a circular double-stranded DNA
C) It has outer and inner membrane

D) Most of electron transport proteins are present in the outer membrane
E) Monoamine oxidase is on the outer membrane

17. Which of following about glycolysis is incorrect?
A) Anaerobic degradation of glucose to lactate
B) Produce 2 mol of ATP from 1 mol of glucose in the absence of glucose
C) all human cells is capable to do glycolysis
D) Pyruvate generated by glycolysis is oxidized to CO2 in Golgi.
E) It requires NAD^+

18. Which of following about uric acid is correct?
A) End product of purines.
B) The production of uric acid from xanthine requires CO2
C) The gout is characterized by less of uric acid
D) Is very soluble in aqueous medium
E) NADH is required to form uric acid

19. What is the function of glutathione?
A) prevent amino acids across cell membrane
B) Produce peroxides
C) It conjugates with drugs to make more lipid soluble
D) Acts as a cofactor
E) None of above is correct.

20. Which of following statement is incorrect?
A) Ketone bodies are form from acetyl CoA
B) Cytochrome C is an electron carrier
C) 6-phosphofructo-2-kinase decreases as blood glucagon rises
D) β-oxidation of fatty acids uses $NADP^+$
E) Ornithine can be converted to proline

二、簡答題：10%

1. What is the functional difference between mRNA, rRNA and tRNA? (5 points)

2. What is the effect of excitatory and inhibitory neurotransmitters on ligand-gated ion channel? (5 points)

Part II：50%

I. Please select one of the best answers in the following questions (2% each)

1. Which of the following terms is not used to describe a parameter of DNA topology?
   (A) wobble
   (B) writhe
   (C) twist
   (D) linking number

2. Which structural property of DNA is crucial for the conservation of genetic information?
   (A) antiparallelism
   (B) the ability to form a double helix
   (C) base-pair complementarity
   (D) all of the above

3. The ability of DNA to denature is important for which process?
   (A) DNA synthesis
   (B) nucleic acid hybridization experiments
   (C) RNA synthesis
   (D) all of the above

4. Which of the following factors recognizes the UAG, UAA, and UGA codons?
   (A) RNA polymerase
   (B) DNA polymerase
   (C) termination factors
   (D) elongation factors

5. Which of the following is a typical feature of prokaryotic genes?
   (A) polycistronic messenger RNAs
   (B) complex transcription units
   (C) introns
   (D) a and c

6. Which of the following lead(s) to a point mutation?
   (A) deamination of a cytosine base into a uracil base
   (B) benzo(a)pyrene conversion of guanine to a thymine base

(C) deamination of 5-methyl cytosine into thymine
(D) all of the above

7. When p53 activated during severe DNA damage, which of the following occur(s)?
(A) It induces apoptosis.
(B) It is a transcription factor.
(C) It serves as a tumor suppressor.
(D) all of the above

8. Which of the following is defined as the tertiary structure of a protein?
(A) the primary amino acid sequence
(B) structural domains such as a DNA binding domain
(C) folded structures such as an α helix
(D) structural features such as a turn

9. Which of the following is not part of a zinc-finger motif?
(A) zinc ion
(B) proline residue
(C) cysteine residue
(D) histidine residue

10. The *Km* for an enzyme-catalyzed reaction
(A) determines the shape of the kinetics curve.
(B) determines the *Vmax* for the reaction.
(C) is a measure of the affinity of the substrate for the enzyme.
(D) is a measure of the rate of the reaction.

11. Which of the following plays a role in the degradation of proteins?
(A) chaperonin
(B) ubiquitin
(C) proteasome
(D) b and c
(E) all of the above

12. Protein self-splicing
(A) is autocatalytic.
(B) occurs in all eukaryotes.

(C) is an ATP-dependent process.
(D) a and b.
(E) all of the above

13. Which of the following pairs of proteins are considered to be paralogous?
(A) yeast α-tubulin and yeast β tubulin
(B) yeast α-tubulin and worm α tubulin
(C) fly β-tubulin and human β tubulin
(D) worm β-tubulin and human α tubulin

14. All the following statements are true about a nucleosome except
(A) It contains an octamer core of histones
(B) It is about 10 nm in diameter
(C) It is the "string" of the "beads-on-a-string" appearance
(D) It contains approximately 150 base pairs of DNA

15. In mammals, X-chromosome inactivation
(A) occurs in half the diploid cells of the adult female.
(B) results from the ionization of the X-chromosome.
(C) is considered an epigenetic event.
(D) b and c

II. Please answer in detail for the following questions (5% each)

1. A double-stranded piece of DNA containing the sequence GCATGGCCACTACCG has a higher Tm than one containing the sequence GAATGGTAACAACTG. Describe the properties of DNA that make this true.

2. Describe the two major pathways for transposition of mobile elements.

3. Describe how modification of histone tails can control chromatin condensation.

4. What is the basis for separation of proteins by two-dimensional gel electrophoresis? Why is this better for resolving a mixture of proteins compared to one-dimensional gel electrophoresis?