

※ 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：44 points (2 points/each)

1. Which one of the following statement regarding to the following peptide is incorrect?

Pro-Cys-Glu-Asn-Gly-Ser-Cys-Ala

- a) This peptide is able to form disulfide bond
- b) Glu is glutamine
- c) There is no essential amino acid in this peptide
- d) There are nonpolar amino acids in this peptide.

2. Which one of followings about mitochondria DNA (mDNA) is correct?

- a) Contains their own DNA
- b) The mDNA is linear
- c) From both the parent.
- d) Codes for all the proteins required to maintain mitochondria structure.

3. The cholesterol

- a) Is a combination of steroid and alcohol.
- b) Is the basis to synthesis vitamin A
- c) Is synthesis in the pancreas in the human body.
- d) Is soluble in the blood.

4. What is the best description of isomerase?

- a) Joins two molecules together.
- b) Catalyzes the hydrolysis of a chemical bond
- c) Catalyzes a spatial rearrangement of the substrate molecular.
- d) Transfer one functional domain from one substrate to another.

5. Which of the following statement is correct?

- a) Coenzyme A is for the oxidation of pyruvate.
- b) Coenzyme Q10 is derived from vitamin B
- c) NAD^+ is derived from vitamin A
- d) NAD^+ plays an important role in the Golgi.

6. Which of the following statement is incorrect?

- a) Fat is stored as triacylglycerol
- b) Triacylglycerol is water insoluble.
- c) Bile salts are needed to absorb the water-soluble vitamins
- d) Vitamin E is a fat soluble vitamin

7. Which step is not needed to obtain energy from fatty acid?
 - a) Oxidation to acetyl-CoA
 - b) Transport to mitochondria
 - c) Activation
 - d) Glycosylation

8. Each NADH produces
 - a) 3ATP
 - b) 2ATP
 - c) 5ATP
 - d) 1ATP

9. Which one of followings is the possible fate of pyruvate?
 - a) Oxidative phosphorylation
 - b) Anaerobic fermentation
 - c) Covert into lactate
 - d) All of them

10. Which of the following statement about RNA is incorrect?
 - a) Usually found as a double helix
 - b) Contains uracil
 - c) Contains deoxyribose sugar
 - d) The sugar in RNA has an OH group

11. How many ATP will be produced from anaerobic glycolysis?
 - a) 4ATP
 - b) 3ATP
 - c) 2ATP
 - d) 1ATP

12. The following statement is not true
 - a) Many proteins self-assemble into the correct form.
 - b) Heat shock protein increases cellular stress
 - c) A denatured proteins form a random coil
 - d) Proteins in general requires chaperonins for proper folding

13. Which of the following tissues requires insulin to glucose transport?
 - a) Kidney
 - b) Brain
 - c) Muscle
 - d) Liver

14. What will not happen in the low insulin level?
- Decreased 3-hydroxybutyrate
 - Decreased glycogen synthesis
 - Increased gluconeogenesis
 - Increased glycogenolysis
15. Which statements regarding to the urea cycle is incorrect?
- Ammonia and aspartate are two nitrogens enter urea cycle
 - Hydrolysis arginine produces urea
 - The urea cycle occurs only in the mitochondria
 - Food that rich in protein increases urinary urea
16. Which one of statement is incorrect?
- Vitamin B12 requires glycoprotein for its absorption.
 - Retinoic acid can not be reduced to retinol
 - Vitamin K is fat soluble vitamin
 - Vitamin B12 is involved in the transfer of amino group.
17. Which of following is involved in the synthesis of triacylglycerols in adipose?
- Remove fatty acyl CoA from a diacylglycerol
 - Add Glycerol 3-phosphoate to a diacylglycerol
 - Hydrolysis of phosphatidic acid by a phosphatase
 - Oxidation of dihydroxyacetone phosphate
18. Which one is only for inhibitory neurotransmitter?
- Gamma-aminobutyric acid (GABA)
 - Acetylcholine
 - Dopamine
 - Serotonin
19. Which one is not directly involved in the TCA cycle?
- Citrate
 - Succinyl CoA
 - Malate
 - FADH₂
20. Which one is not belonged to Catecholamines?
- Dopamine
 - Norepinephrine
 - Epinephrine
 - Serotonin

21. Which of following statements regarding to the acetylcholine is incorrect?

- a) Requires acetylcholine receptor on the presynaptic membrane to react
- b) Most of the acetylcholinesterase is on the postsynaptic membrane
- c) After released acetylcholine will be digest into acetate and choline
- d) Most acetylcholine in the neuron are stored in the vesicle

22. Which of following about Immunoglobulins is true?

- a) 2 polypeptide chains
- b) 4 copies of each of chain
- c) All chains are linked by disulfide bonds
- d) Immunoglobulin class is determined by the C_L regions

二、簡答題：6 points

1. What are the 3 major sources of acetylCoA?

Part II : 50%

一、選擇題：30 points (2 points/ each)

1. Which of the following statements regarding the structure of DNA is correct?

- A) the two strands are parallel.
- B) the two strands have complementary base pairing.
- C) the two strands are held together by intrachain hydrogen bonds.
- D) the hydrogen bonding that holds the helix together is always between two purines or between two pyrimidines.
- E) the ratio of adenine to guanine is the same in all organisms.

2. In a sample of double-stranded DNA containing 32% cytosine, the percentage of adenine would be:

- A) 18%
- B) 68%
- C) 32%
- D) 0%
- E) insufficient information to answer question

3. What is the nucleotide sequence of the DNA strand that is complementary to

5'-ATCGCAACTGTCAC^TA-3'?

- A) 5'-TAGCGTTGACAGTGAT-3'
- B) 5'-UAGUGACAGUUGCGAU-3'
- C) 5'-UAGCGUUGACAGUGAU-3'

D) 5'-ATCACTGTCAACGCTA-3'

E) 5'-TAGTGACAGTTGCGAT-3'

4. In eukaryotic cells, DNA is found principally in the nucleus, but it also occurs in which of the followings.

- A) ribosomes; mitochondria
- B) chloroplasts; peroxisomes
- C) mitochondria; chloroplasts
- D) peroxisomes; vacuoles
- E) vacuoles; mitochondria

5. Eukaryotic ribosomes contain 28S rRNA. What does 28S stand for?

- A) number of sugars
- B) splicing number
- C) splicing coefficient
- D) sequence repeats
- E) sedimentation coefficient

6. Which of the following correctly describes tRNA molecules?

- A) each amino acid in proteins has at least three unique tRNA species dedicated to chauffeuring its delivery to ribosomes for insertion into growing polypeptides.
- B) they often contain bases such as inosine or pseudouridine.
- C) they are small molecules containing 73 or 74 bases.
- D) the 5' end of the molecule is the site of attachment for the amino acid.
- E) none of the above is correct.

7. Which of the followings are important in the processing of eukaryotic gene transcripts into mature messenger RNAs for export from the nucleus into cytoplasm.

- A) snRNAs
- B) tRNAs
- C) rRNAs
- D) siRNAs
- E) stRNAs

8. Which of the following restriction sites would provide staggered 3'ends? The restriction enzyme-cutting site in each sequence is shown by an empty space.

- A) 5'-T TCGAA-3'
- B) 5'-GTT AAC-3'
- C) 5'-CCC GGG-3'
- D) 5'-CTGCA G-3'
- E) none of the above

9. Which of the following explains why it is often easier to sequence a gene rather than sequence the corresponding protein?
- A) DNA sequencing can be performed on picogram quantities of DNA.
 - B) DNA is composed of only 4 different monomers while proteins are composed of 20 different monomers.
 - C) restriction endonucleases can be used to cut DNA at specific sequences to generate DNA fragments that can easily be sequenced.
 - D) all of the above.
 - E) both B and C are correct.
10. Dehydrogenases are enzymes that:
- A) move hydrogens within the molecule.
 - B) add hydrogens across double bonds.
 - C) transfer hydride ions to NAD^+ (or NADP^+) and release a proton.
 - D) transfer hydrogens between substrates.
 - E) all are true.
11. One advantage of nuclear magnetic resonance (NMR) spectroscopy for the investigation of metabolism is that it utilizes:
- A) non-invasive techniques.
 - B) specific metabolic inhibitors.
 - C) autoradiography.
 - D) radioisotopes.
 - E) none are true.
12. All of the following are a coenzyme or a precursor of a coenzyme EXCEPT:
- A) thiamin.
 - B) retinol.
 - C) riboflavin.
 - D) niacin.
 - E) biotin.
13. Which of the following metabolic pathways is strictly anabolic?
- A) Glycolysis
 - B) Gluconeogenesis
 - C) citric acid cycle
 - D) pentose phosphate cycle
 - E) beta-oxidation of fatty acids
14. Which of the following enzymes is activated upon phosphorylation by AMP activated protein kinase?
- A) acetyl CoA carboxylase

- B) glycogen synthase
- C) phosphofructokinase-2
- D) 3-hydroxy-3-methylglutaryl-CoA reductase
- E) none of the above

15. Nucleotide sequences that identify the location of transcription start sites and regulate the level of transcription are called:

- A) promoters.
- B) Pribnow boxes.
- C) TATA boxes.
- D) sigma factors.
- E) enhancers.

二、簡答題：20 points (4 points/each)

1. Since dUTP is not a normal component of DNA, why do you suppose ribonucleotide reductase has the capacity to convert UTP to dUTP?
2. Why are sulfonamides effective against bacteria but not animal cells?
3. How do DNA gyrases and helicases differ in their respective functions and modes of action?
4. Assume DNA replication proceeds at a rate of 100 base pairs per second in human cells and origins of replication occur every 300-kb pair. Assume also the DNA polymerase III is highly processive and only 2 molecules of DNA polymerase III are needed per replication fork. How long would it take to replicate the entire diploid human genome (i.e. 6×10^9 base pairs) ? How many molecules of DNA polymerases does each cell need to carry out this task?
5. Transposons are mutagenic agents, why?