

※ 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. 單選題 (30 分，每題 2 分)

1. In biological system, oxidation is always accompanied by

- (A) gain of electrons.
- (B) reduction of an electron acceptor.
- (C) protection of damage.
- (D) loss of oxygen.

2. Which of the following statement about ATP is **Correct**:

- (A) It is function in the body as a complex with Fe^{2+} .
- (B) It is used as an energy store in the body.
- (C) It is function in the body as a complex with Mg^{2+} .
- (D) It contains three high energy phosphate bonds.

3. Nearly all products of digestion of carbohydrates, fat, and proteins are metabolized to a common metabolite _____, before oxidation to CO_2 in the citric acid cycle.

- (A) pyruvate.
- (B) glucose
- (C) triacylglycerol
- (D) acetyl-CoA

4. Which of the following reaction is the cytosolic pathway of all mammalian cells for the metabolism of glucose (or glycogen) to pyruvate and lactate?

- (A) Glycolysis
- (B) TCA cycle
- (C) oxidative-phosphorylation reaction
- (D) gluconeogenesis

5. Which one of the following statements about glycogen metabolism is **Correct**?

- (A) Liver synthesizes more glycogen when the hepatic portal blood concentration of glucose is high.
- (B) The plasma concentration of glycogen increased in the fed state.
- (C) Glycogen is mainly stored in liver and brain.
- (D) Glucose-6-phosphate is formed from glycogen by the action of the enzyme glycogen phosphorylase.

6. Fatty acid oxidation in mitochondria leads to the generation of large quantities of ATP by a process called:

- (A) TCA cycle.
- (B) β -oxidation.

- (C) lipogenesis
(D) lipolysis
7. Which one of the following statements is **Not Correct**?
- (A) Triacylglycerol is the main storage lipid in adipose tissue.
(B) Excess cholesterol is excreted from the liver in the bile as cholesterol or bile salts.
(C) Fatty acids occur in the body mainly in the form of nonesterified fatty acids.
(D) High levels of HDL have a protective effect against atherosclerosis.
8. Which one of the following amino acids form norepinephrine and epinephrine, and following iodination the thyroid hormones?
- (A) Glycine
(B) Arginine
(C) Proline
(D) Tyrosine
9. The first reaction in the degradation of the most of the protein amino acids involves the participation of:
- (A) NAD⁺
(B) Thiamine pyrophosphate (TPP)
(C) NAD⁺ and TPP
(D) pyridoxal phosphate
10. Which component of DNA duplex cause the molecule to have a negative charge at physiological pH?
- (A) deoxyribose
(B) phosphate groups
(C) chlorine ion
(D) adenine
11. Which one of the following enzymes synthesize RNA from a double stranded DNA template?
- (A) Reverse transcriptase
(B) RNA-dependent RNA polymerase
(C) DNA-dependent RNA polymerase
(D) RNA-dependent replicase
12. What is the name of the unusual repeated stretch of DNA localized at the tips of all eukaryotic chromosomes?
- (A) telomere

(B) centriole

(C) kinetochore

(D) chromosome

13. What molecule enable cells to respond to a specific extracellular signaling molecule?

(A) Contact integrins

(B) Cell membrane lipid bilayer

(C) Specific receptor carbohydrates localized to the inner membrane surface

(D) Receptors that specifically recognize and bind that particular messenger molecule

14. Which one of the following explains the antioxidant action of vitamin E?

(A) Oxidized vitamin E can be reduced back to active vitamin E with glutathione peroxidase.

(B) It can react with other radicals to form a nonradical product.

(C) It forms a stable radical that can be reduced back to active vitamin E by reaction of vitamin C.

(D) It is converted to a stable radical by reaction of vitamin C.

15. Which one of the following vitamins provides the cofactor for reduction reaction in fatty acid synthesis?

(A) Folate

(B) Niacin

(C) vitamin B

(D) vitamin A

二、問答題: 70 分

1. Please describe the process of transcription, translation, and protein maturation. (20%)

2. Please describe the mechanism of allopurinol in treating hyperuricemia and gout arthritis. (10%)

3. Cell membranes are complex dynamic structures composed of lipids, proteins, and carbohydrates-containing molecules.

(1). What is the function of cell membrane? (10%)

(2). What is the function of lipids, proteins, and carbohydrates in cell membrane? (15%)

4. Cholesterol balance in tissue is maintained between the factors causing gain or loss of cholesterols. Please describe the mechanisms of this balance reaction and what is the role of HDL and LDL in regulating cholesterol balance? (15%)