

※ 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、選擇題 20 題：(40 分，每題 2 分)

1. A protein engineer desires to alter the active site of chymotrypsin then it will cleave peptide bonds to the C-terminal side of aspartyl and glutamyl residues. The protein engineer will be most likely to be succeed if he replaces the hydrophobic amino acids at the bottom of the active site with:
 - (a). proline
 - (b). lysine
 - (c). threonine
 - (d). glycine
 - (e). phenylalanine
2. All of the following are correct about cytochrome P450 *except*:
 - (a). They are able to accept electrons from NADH.
 - (b). They are monooxygenase enzymes.
 - (c). They are found only in the endoplasmic reticulum.
 - (d). They work in conjugation with cytochrome b5 in some reactions.
 - (e). They are important metabolic enzymes.
3. Which of the following statements about ATP synthase is *correct*?
 - (a). The F_1 subcomplex is fixed to the membrane and does rotate.
 - (b). It requires an electron motive force to form ATP in the presence of ADP and P_i .
 - (c). ATP cannot be produced when part of the molecules rotates.
 - (d). It is located in the inner mitochondria membrane.
 - (e). Two ATP molecule is formed for each full revolution of the molecule.
4. Which of the following statements about metabolism of sugars is *correct*?
 - (a). Galactose is phosphorylated to galactose-1-phosphate by galactokinase.
 - (b). Fructokinase phosphorylates fructose to fructose-6-phosphate.
 - (c). Fructose is an aldose sugar like glucose.
 - (d). Fructose transport into cells is insulin dependent.
 - (e). Sucrose can be biosynthesized from glucose and fructose in the liver.
5. In glycolysis, the conversion of 1 molecule of fructose 1,6-bisphosphate to 2 molecules of pyruvate results in the formation of
 - (a). 1 mol NAD^+ and 2 mol of ATP.
 - (b). 1 mol NAD^+ and 1 mol of ATP.
 - (c). 2 mol NAD^+ and 4 mol of ATP.

- (d). 2 mol NADH and 2 mol of ATP.
(e). 2 mol NADH and 4 mol of ATP.
6. Which of the following will provide the main fuel for muscle contraction during short-term maximum exertion?
- (a). Muscle reservation of triacylglycerol.
(b). Plasma glucose.
(c). Muscle glycogen.
(d). Plasma fatty acids.
(e). Liver cholesterol.
7. Which one of the following statements about carbohydrate metabolism is *correct*?
- (a). Glycogen can be broken down to glucose-6-phosphate in muscles then release free glucose by the action of glucose-6-phosphatase.
(b). Glycogen is mainly stored in brain and liver.
(c). Insulin inhibits the biosynthesis of glycogen.
(d). A key step in the biosynthesis of glycogen is the formation of UDP-glucose.
(e). There is a greater yield of ATP in anaerobic glycolysis than the cost for the synthesis of glucose form lactate.
8. Identifying the metabolite that does **NOT** serve as a precursor of a dietarily essential amino acid:
- (a). Aspartate.
(b). Glutamate
(c). Histamine
(d). α -ketoglutarate
(e). 3-phosphoglycerate
9. For metabolic disorders of the urea cycle, which statement is *not correct*?
- (a). Clinical signs can include acidosis.
(b). Ammonium intoxication is most severe when the metabolic block in the urea cycle occurs.
(c). Clinical symptoms include mental retardation and the avoidance pf protein-rich foods.
(d). Dietary management focuses on a low-protein diet ingested as frequent small meals.
(e). Aspartate provides the second nitrogen of arginosuccinate.
10. Which of the following is **NOT** a hemoprotein?
- (a). Myoglobin
(b). Albumin

- (c). catalase
 - (d). cytochrome c
 - (e). cytochrome P450
11. The interacting bonds that connecting the nucleotides of RNA and DNA are termed:
- (a). *N*-glycosidic bonds
 - (b). phosphomonoesters
 - (c). hydrogen bonds
 - (d). peptide nucleic acid bonds
 - (e). 3'-5'-phosphodiester linkages
12. Which of the following components are found in DNA?
- (a). A phosphor group, guanine, and ribose
 - (b). A phosphor group, adenine, and ribose
 - (c). A phosphor group, uracil, and deoxyribose
 - (d). A phosphor group, guanine, and deoxyribose
 - (e). A phosphor group and guanine
13. Which component of the DNA duplex causes the molecule to have a net negative charge of physiological pH?
- (a). Deoxyribose
 - (b). Phosphate groups
 - (c). Chlorine ion
 - (d). Ribose
 - (e). Adenine
14. Name the mechanism through which RNAs are synthesized from DNA.
- (a). Transcription
 - (b). Translation
 - (c). Replication
 - (d). Duplication
 - (e). Revers transcription
15. What is the name of the unusual repeated stretch of DNA localized at the tips of all eukaryotic chromosomes?
- (a). Telomere
 - (b). Centriole

- (c). Chromomere
- (d). Kinetochore
- (e). Micromere

16. Which one of the following is **NOT** a phospholipid?

- (a). Sphingomyelin
- (b). Plasminogen
- (c). Galactosylceramide
- (d). Cardiolipin
- (e). Lysolectin

17. The subcellular site of the breakdown of long chain fatty acids to acetyl-CoA via β -oxidation is:

- (a). The cytosol
- (b). The endoplasmic reticulum
- (c). The Golgi apparatus
- (d). The inner membrane of mitochondria
- (e). The matrix of mitochondria

18. Which of the following lipoproteins is synthesized in intestinal mucosa, containing a high concentration of triacylglycerol and responsible for the transport of dietary lipids in the circulation?

- (a). Low-density lipoprotein
- (b). Very low-density lipoprotein
- (c). High-density lipoprotein
- (d). Intermediate-density lipoprotein
- (e). Chylomicrons

19. Which of the following statement concerning the biosynthesis of cholesterol is *correct*?

- (a). The initial substrate is mevalonate.
- (b). Squalene is the first cyclic intermediate in the pathway.
- (c). All the carbon atoms in the cholesterol synthesized the originate from acetyl-CoA.
- (d). Synthesis occurs in the cytosol of the cell.
- (e). The rate-limiting step is the formation of HMG-CoA by HMG-CoA synthase.

20. Which of the following is **NOT** an activity of cytochrome P450?

- (a). Activation of vitamin D.
- (b). Hydroxylation of xenobiotics.
- (c). Oxidation of xenobiotics.

(d). Methylation of retinoid acid.

(e). Hydroxylation of retinoid acid.

二、問答題 (4 題，共 60 分):

1. Explain and illustrate the primary, secondary, tertiary, and quaternary structure of proteins. (15%)
2. Describe the pathway of glycolysis and its control (15%), and explain how glycolysis can operate under anaerobic conditions (5%)? (共 20%)
3. Describe the general structure of triacylglycerols and indicate their function. (10%)
4. Explain the steps, the phases, and the regulatory molecules for the cell cycle. (15%)