

科目：生物化學

適用：應化系(生物醫學碩士班)

考生注意：

1. 依次序作答，只要標明題號，不必抄題。
2. 答案必須寫在答案卷上，否則不予計分。
3. 限用藍、黑色筆作答；試題須隨卷繳回。

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第 1 頁

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一、選擇題: (50%, 每小題 2%)

1. The following equation ($G = \text{glucose}$): $G + G + G \rightarrow G-G-G + 2H_2O$, is an example of (1) ionic bond formation; (2) peptide bond formation; (3) a condensation reaction; (4) a hydrolysis reaction.
2. Which compounds would be lipids or derivatives of lipids? (1) glycogen and cellulose; (2) cholesterol and estrogen; (3) keratin and protease; (4) chlorophyll and hemoglobin.
3. Which process is impossible in biology? (1) $DNA \rightarrow RNA$; (2) $RNA \rightarrow \text{Protein}$; (3) $RNA \rightarrow DNA$; (4) $\text{Protein} \rightarrow RNA$.
4. 18% of glucose ($MW=180$) is equivalent to (1) 10 M; (2) 1 M; (3) 0.1 M; (4) 0.01 M.
5. Which of the following description is not correct regarding DNA and RNA? (1) DNA is generally more stable than RNA; (2) The secondary structure of RNA generally is more complicated than that of DNA; (3) the quantity of RNA in a cell is larger than that of DNA; (4) Based on the observation that RNA is synthesized from DNA, it is generally believed that DNA should appear in the world earlier than RNA.
6. Which factor in the following statement can not determine protein structure? (1) Hydrogen bond; (2) Glycosidic bond; (3) Disulfide bond; (4) Hydrophobic force.
7. Which of the followings amino acids is encoded by the start codon, AUG? (1) Methionine; (2) Serine; (3) Glutamic acid; (4) Aspartic acid.
8. In normal physiological condition, DNA contains: (1) positive charge;

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- (2) negative charge; (3) no charge; (4) It depends on the nucleotide sequence of the DNA.
9. Which of the following descriptions about electron transfer chain is incorrect? (1) Protons are pumped into mitochondrial interspace when high energy electrons are transferred along electron transfer chain; (2) Protons flow back to mitochondrial matrix, leading to the generation of ATP through ATP synthase; (3) Cytochrome oxidase is the final enzyme complex in the electron transfer chain, consumes nearly all oxygen we breath; (4) The electron transfer chain takes place in anaerobic condition.
10. Which statement in the followings is incorrect? (1) Pyruvate cannot be broken down in the absence of oxygen; (2) The stepwise oxidation of sugars begins with glycolysis; (3) The controlled stepwise oxidation of sugars that occurs in cells preserves useful energy; (4) Phosphate bonds in different molecules may have different energy.
11. During glycolysis, which molecule is cleaved to produce two molecules of glyceraldehyde 3-phosphate? (1) Glucose 6-phosphate; (2) Fructose 1, 6-phosphate; (3) Glucose; (4) Fructose 6-phosphate.
12. (1) Cytochrome oxidase; (2) NADH reductase; (3) succinate dehydrogenase; (4) cytochrome b-c complex is the final enzyme complex in the electron transfer chain, consuming nearly all oxygen we breath.
13. The electrochemical proton gradient across the mitochondria inner membrane is used to drive some coupled transport processes including (1) pyruvate; (2) phosphate group; (3) ADP and ATP; (4)

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all of above.

14. The energy from sun is used to produce (1) high energy electron; (2) proton gradient; (3) glucose (4) all of above in the photosynthesis reaction.
15. Which of the following molecules is not produced directly by TCA cycle? (1) GTP; (2) NADH; (3) ATP; (4) CO₂.
16. Which description about the glucose polymers is wrong? (1) Glycogen is produced and stored in liver; (2) Starch is the branch form of glucose polymer; (3) Cellulose serves as a structural role in grass with alternate arrangement of upright and inverted glucose; (4) Glycogen and starch, but not cellulose, can be digested by animal because the former two glucose polymers contain only upright glucose which can be recognized by related enzymes.
17. Which description about energy release from various foods is wrong? (1) The foods including polysaccharide, fat and protein are digested and degraded into simple sugars, fatty acids and glycerol, and amino acids outside cells; (2) These simple sugars, fatty acids and glycerol, and amino acids are diffused into cells from high to low concentration; (3) These simple sugars, fatty acids and glycerol, and amino acids can be converted to acetyl-CoA so that energy is further released from there; (4) Amino acids and simple sugars can be converted to pyruvate and then get into mitochondria for further oxidation.
18. Which of the following molecules serve as the main structural component of plasma membrane? (1) glycoprotein; (2) steroid; (3) glycolipid; (4) phospholipid.

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19. Lipids are (1) composed of one glycerol and one fatty acid; (2) degraded into acetyl Co-A by beta-oxidation; (3) classified into simple, complex (such as cholesterol) and derived lipids (such as phospholipid); (4) all not good to our health.
20. How much volume of the stock solution with 50 mM is required to add to a petridish with 10 ml medium when 250 μ M of final solution is desired? (1) 5 μ l; (2) 50 μ l; (3) 500 μ l; (4) 0.5 μ l.
21. A protein domain is defined as (1) a protein region able to fold independently; (2) a region of enzyme able to bind substrate; (3) an interface between two interaction proteins; (4) a portion of a protein helps organize high order protein structure.
22. Disulfide bond (1) is formed between 2 cystein residues; (2) can be broken down by reducing agent; (3) is critical to the protein conformation; (4) all above are right.
23. Which bond in the following exists in all proteins? (1) phosphodiester bond; (2) glycosidic bond; (3) peptide bond; (4) disulfide bond.
24. Which instrument or technique can be used to determine protein structure? (1) X-ray crystallography; (2) Northern blot; (3) Immunohistochemistry; (4) HPLC.
25. Which of the following technique can be used to assay protein expression level? (1) in situ hybridization; (2) immunodepletion; (3) Western blot; (4) Southern blot.

二、申論題: (50%, 每小題 25%)

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1. 請說明生物化學與化學的相同與差異處為何? (Please describe the similarity and difference between Biochemistry and Chemistry).
2. 請說明為何選考暨大? 未來的兩年有何學習計畫? (Please describe the reasons for choosing National Chin-nan University? What is your study plan?)

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