

臺灣綜合大學系統 108 學年度學士班轉學生聯合招生考試試題

科目名稱	生物化學	類組代碼	C07
		科目碼	C0701
※本項考試依簡章規定各考科均「不可以」使用計算機		本科試題共計 4 頁	
<p><b>A. Multiple Choices</b> (50%, 2% each; one correct answer only, 共 25 題) 請於答案卷上作答，否則不予計分</p>			
<p>1. A solution with a pH of 10 is _____ times as basic as one with a pH of 8. A) 2      B) 3      C) 10      D) 100      E) 1,000</p>			
<p>2. Amino acids are linked by _____ bonds to form the primary structure of a protein. A) Disulfide      B) hydrogen      C) ionic      D) peptide</p>			
<p>3. The information built into a protein's amino acid sequence plus a coiled pattern of that chain and the addition of more folding yields the _____ level of protein structure. A) quaternary      B) primary      C) secondary      D) tertiary</p>			
<p>4. In a lipid bilayer, tails point inward and form a(n) _____ region that excludes water. A) acidic      B) basic      C) hydrophilic      D) hydrophobic</p>			
<p>5. When <math>\text{NAD}^+</math> combines with hydrogen, the <math>\text{NAD}^+</math> is _____. A) reduced      B) oxidized      C) phosphorylated      D) denatured</p>			
<p>6. An allosteric enzyme _____. A) has an active site where substrate molecules bind and another site that binds with intermediate or end-product molecules B) is an important energy-carrying nucleotide C) carries out either oxidation reactions or reduction reactions but not both D) raises the activation energy of the chemical reaction it catalyzes</p>			
<p>7. Glycolysis would quickly halt if the process ran out of _____, which serves as the hydrogen and electron acceptor. A) <math>\text{NADP}^+</math>      B) ADP      C) <math>\text{NAD}^+</math>      D) <math>\text{H}_2\text{O}</math></p>			
<p>8. When glucose is used as an energy source, the largest amount of ATP is generated by the _____ portion of the entire respiratory process. A) glycolytic pathway      B) acetyl-CoA formation      C) Krebs cycle D) electron transport phosphorylation</p>			
<p>9. During the fermentation pathways, a net yield of two ATP is produced from _____; the <math>\text{NAD}^+</math> necessary for _____ is regenerated during the reactions. A) the Krebs cycle; glycolysis      B) glycolysis; electron transport phosphorylation C) the Krebs cycle; electron transport phosphorylation      D) glycolysis; glycolysis</p>			
<p>10. Each DNA strand has a backbone that consists of alternating _____. A) purines and pyrimidines      B) nitrogen-containing bases C) hydrogen bonds      D) sugar and phosphate molecules</p>			
<p>11. A buffer _____. A) is an acid that is used to offset overly basic conditions in the body B) is a base that is used to offset overly acidic conditions in the body C) donates <math>\text{H}^+</math> ions when conditions become too basic and accepts <math>\text{H}^+</math> ions when conditions become too acidic D) donates <math>\text{OH}^-</math> ions when conditions become too basic and accepts <math>\text{OH}^-</math> ions when conditions become too acidic</p>			

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<p>12. The molecular formula of most monosaccharides represents a multiple of _____.</p> <p>A) CH<sub>3</sub>O      B) CH<sub>2</sub>O      C) CHO      D) CHO<sub>2</sub>      E) CHO<sub>3</sub></p> <p>13. One way to convert an oil into a substance that is solid at room temperature is to _____.</p> <p>A) add hydrogens, decreasing the number of double bonds in the molecules            B) remove water, causing a dehydration synthesis reaction to occur            C) remove hydrogens, increasing the number of double bonds            D) put it in the refrigerator; when unsaturated fats cool, double bonds form and fats solidify            E) add water and shake vigorously</p> <p>14. Anything that prevents ATP formation will _____.</p> <p>A) result in cell death      B) force the cell rely on lipids for energy            C) result in the conversion of kinetic energy to potential energy            D) force the cell to rely on ADP for energy      E) have no effect on the cell</p> <p>15. The active site of an enzyme is _____.</p> <p>A) the region of a substrate that is changed by an enzyme            B) the highly changeable portion of an enzyme that adapts to fit the substrates of various reaction            C) the region of an enzyme that attaches to a substrate            D) the region of a product that detaches from the enzyme            E) both a and d</p> <p>16. Heating inactivates enzymes by _____.</p> <p>A) breaking the covalent bonds that hold the molecule together            B) removing phosphate groups from the enzyme            C) causing enzyme molecules to stick together            D) breaking the hydrogen bonds that give the molecules its three-dimensional shape            E) none of the above</p> <p>17. How does inhibition of an enzyme-catalyzed reaction by a competitive inhibitor differ from inhibition by a noncompetitive inhibitor?</p> <p>A) Competitive inhibitors interfere with the enzyme; noncompetitive inhibitors interfere with the reactants.            B) Competitive inhibitors bind to the enzyme reversibly; noncompetitive inhibitors bind to it irreversibly.            C) Competitive inhibitors change the enzyme's tertiary structure; noncompetitive inhibitors cause polypeptide subunits to dissociate.            D) Competitive inhibitors bind to the active site of the enzyme; noncompetitive inhibitors bind to a different site.            E) Competitive inhibitors are inorganic substances such as metal ions; noncompetitive inhibitors are vitamins or vitamin derivatives.</p> <p>18. Bacterial production of the enzyme needed for the synthesis of the amino acid tryptophan decline with increasing levels of tryptophan and increases as tryptophan levels decline. This is an example of _____.</p> <p>A) competitive inhibition      B) noncompetitive inhibition      C) negative feedback            D) positive feedback      E) irreversible inhibition</p>			

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19. Facilitated diffusion across a biological membrane requires \_\_\_\_\_ and removes a substance \_\_\_\_\_ its concentration gradient.  
 A) energy and transport proteins...down      B) energy...down      C) transport proteins...down  
 D) energy and transport proteins...against      E) transport proteins...against
20. An inherited lack (or shortage) of functional LDL receptors causes \_\_\_\_\_.  
 A) type I diabetes      B) Marfan's syndrome      C) hypercholesterolemia  
 D) hyperbilirubinemia
21. The ultimate source of nearly all energy available to life on Earth is \_\_\_\_\_.  
 A) photosynthesis      B) cellular respiration      C) electricity      D) wind      E) sunlight
22. During redox reactions, \_\_\_\_\_.  
 A) the loss of electrons from one substance is called reduction  
 B) a substance that gain electron is said to be oxidized  
 C) electrons are lost from one substance and added to another substance  
 D) protons from one molecule replace the electrons lost from another molecule  
 E) A, B, and C
23. Unlike those of eukaryotes, the electron transport chains or prokaryotes are located in/on the \_\_\_\_\_.  
 A) endoplasmic reticulum      B) nuclear membrane      C) central vacuole  
 D) plasma membrane      E) Golgi apparatus
24. The end-products of glycolysis include \_\_\_\_\_.  
 A) FADH      B) NADH      C) acetyl CoA      D) citric acid      E) O<sub>2</sub>
25. What maintains the secondary structure of a protein?  
 A) peptide bond      B) disulfide bridges      C) hydrogen bonds  
 D) ionic bonds      E) electrostatic charges

**B. Essays (50%, 共 9 題)**

1. Animals cannot convert fatty acids to glucose. Why? (5%)
2. Give the location of the following metabolisms in cells:  
 (a) glycolysis (1%)  
 (b) citric acid cycle (1%)  
 (c) glyoxylate cycle (1%)  
 (d) pyruvate oxidative decarboxylation (1%)  
 (e) oxidative phosphorylation (1%)  
 (f) pentose phosphate pathway (1%)  
 (g) gluconeogenesis (1%)
3. Give the pathway of respiratory electron-transport chain from NADH to O<sub>2</sub>. (4%)
4. Give two major routes for production of NADPH in mammals. (4%)

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<p>5. Give the structure of the following molecules:</p> <p>(a) arginine (1%)                  (b) tryptophan (1%)                  (c) threonine (1%)                  (d) valine (1%)                  (e) <math>\gamma</math>-carboxyglutamate (1%)                  (f) pyruvate (1%)                  (g) succinate (1%)                  (h) <math>\alpha</math>-ketoglutarate (1%)                  (i) phosphoenolpyruvate (1%)                  (j) lactate (1%)</p> <p>6. What structural differences characterize amylose and amylopectin? (5%)</p> <p>7. Indicate whether each of the following pairs of sugars consists of anomers, epimers, or an aldose-ketose pair:</p> <p>(a) D-glyceraldehyde and dehydroxyacetone (1%)                  (b) D-glucose and D-mannose (1%)                  (c) <math>\alpha</math>-D-glucose and <math>\beta</math>-D-glucose (1%)                  (d) D-glucuronic acid and L-iduronic acid (1%)                  (e) D-ribose and D-ribulose (1%)</p> <p>8. The <math>pK_a</math> of the <math>\alpha</math>-COO<sup>-</sup> and <math>\alpha</math>-NH<sub>3</sub><sup>+</sup> group is less than that of acetic acid and methylamine, respectively. Why? (5%)</p> <p>9. Ketone bodies will be built up in the fasting mice. Why? (5%)</p>			