臺灣綜合大學系統106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

A. Multiple Choices (50%, 2% each; one correct answer only, 共 25 題)

1. A solution having a pH of 5 would have this many times as much hydrogen ion concentration as a solution having a pH of 8:
   A) 10　B) 100　C) 1000　D) 10000　E) 100000

2. The Michaelis-Menten constant (K_m) is:
   A) The time for half of the substrate to be converted to product.
   B) The time for all of the substrate to be converted to product.
   C) The [S] that gives half of the maximum reaction rate.
   D) The [S] that gives the maximum reaction rate.
   E) The [P] that is produced when the enzyme is saturated with the substrate.

3. Which of the following would allow you to determine the isoelectric point of a protein?
   A) protein quaternary structure　B) protein solubility as a function of pH
   C) protein size　D) protein shape
   E) protein tertiary structure

4. The fact that allosteric enzymes are remarkably sensitive to control makes them ideal candidates for:
   A) The initial steps in a pathway　B) The rate-limiting steps in a pathway
   C) The final steps in a pathway　D) All the steps in a pathway
   E) Alternative pathways

5. In a plot of 1/V against 1/[S] for an enzyme-catalyzed reaction, the presence of a competitive inhibitor will alter the:
   A) V_{max}.　B) intercept on the 1/V axis.　C) intercept on the 1/[S] axis.
   D) curvature of the plot.　E) pK of the plot.

6. The chirality of an amino acid results from the fact that its α-carbon:
   A) is a carboxylic acid.　B) is bonded to four different chemical groups.
   C) is symmetric.　D) is in the L absolute configuration in naturally occurring proteins.
   E) has no net charge.

7. An enzyme which has a high turnover number:
   A) Can easily be denatured　B) Can easily be replaced with another enzyme
   C) Needs a constant supply of cofactors　D) Converts substrate to product very rapidly
   E) Can be easily controlled

8. On the x and y axes of a Lineweaver-Burk plot, the largest values of substrate concentration will be found:
   A) At the top of the y axis　B) At the intercept on the y axis
   C) At the right end of the x axis　D) At the intercept on the x axis
   E) At the origin

背面有題，請繼續作答。

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9. In the Beer-Lambert equation, A = εbc, what quantity is represented by "ε"?
A) Absorptivity　B) Molar absorptivity　C) Path length　D) None of these

10. The primary stabilizing force of protein secondary structure is:
A) Ionic bonds.　B) Covalent bonds.　C) Van der Waals forces.
D) Hydrogen bonds.　E) None of the Above.

11. Which of the following is (are) TRUE of SDS-PAGE?
A) Proteins are separated on the basis of their charge in SDS-PAGE.
B) Molecular weight is determined by plotting (linear) molecular weight versus only the distance the protein band has moved from the beginning.
C) Highly folded proteins move more slowly on an SDS gel.
D) It is a molecular sieving approach.　E) All of the Above.

12. Which of the following amino acids are more likely to be found in a protein's interior away from aqueous solvent molecules?
A) Val, Leu, Ile, Met, and Phe　B) Ser, Thr, Asn, Gln, and Tyr
C) Arg, His, Lys, Asp, and Glu　D) All of the above.
E) None of the Above.

13. Which reagent is best suited for determination of the amino acid sequence of a small peptide
A) Ninhydrin　B) Phenyl iosthiocynate　C) CNBr　D) Trypsin

14. Bisphosphoglycerate (BPG) cannot bind to the oxygenated R state of hemoglobin because
A) it is displaced from the heme by oxygen
B) it is displaced from the heme by movement of the proximal histidine
C) its binding pocket becomes too small to accommodate BPG
D) BPG binds to the R state with the same affinity as the T state

15. The peptide bond in proteins is
A) planar, but rotates to three preferred dihedral angles
B) nonpolar, but rotates to three preferred dihedral angles
C) nonpolar, and fixed in a trans conformation
D) planar, and usually found in a trans conformation

16. The peptide sequence of letters 'WYQN' will represent
A) Tryptophan, tyrosine, glutamic acid, asparagine
B) Tryptophan, tyrosine, glutamine, asparagine
C) Tryptophan, glutamine, tryptophan, asparagine
D) Glutamine, tyrosine, tryptophan, aspartic acid

17. Ubiquitination of proteins modifies the side chain of _____ residue.
A) Asn　B) Lys　C) Arg　D) Cys　E) Ser

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18. Which pair of amino acids absorbs the most UV light at 280 nm?
A) Thr & His.　B) Trp & Tyr.　C) Cys & Asp.
D) Phe & Pro.　E) None of the above.

19. The quaternary structure of human hemoglobin is best described as a
A) dimer of two myoglobin dimers.　B) tetramer of identical subunits.
C) tetramer of four different subunits.　D) tetramer of two different subunits.

20. Protein glycosylation doesn't modify the side chain _____ residue.
A) asparagine　B) hydroxylysine　C) threonine　D) glutamine　E) serine

21. An allosteric inhibitor of an enzyme usually
A) binds to the active site.　B) participates in feedback regulation.
C) denatures the enzyme.　D) causes the enzyme to work faster.
E) is a hydrophobic compound.

22. A peptide was found to have a molecular mass of about 650 and upon hydrolysis produced Ala, Cys, Lys, Phe, and Val in a 1:1:1:1:1 ratio. The peptide upon treatment with Sanger's reagent produced DNP-Cys and exposure to carboxypeptidase produced valine. Chymotrypsin treatment of the peptide produced a dipeptide that contained sulfur and has a UV absorbance, and a tripeptide. Exposure of the peptide to trypsin produced a dipeptide and a tripeptide. Deduce the sequence of the peptide.
A) Val-Ala-Lys-Phe-Cys　B) Cys-Lys-Phe-Ala-Val
C) Cys-Ala-Lys-Phe-Val　D) Cys-Phe-Lys-Ala-Val
E) Val-Phe-Lys-Ala-Cys

23. An holoenzyme is
A) a coenzyme　B) an enzyme with its cofactor
C) an enzyme lacking its cofactor　D) an allosteric enzyme
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25. For the reaction, the steady state assumption
A) implies that $k_1=k_{-1}$　B) implies that k_{-1} and k_2 are such that the $[ES] = k_1[ES]$
C) $[P]>>[E]$　D) $[S] = [P]$
E) ES breakdown occurs at the same rate as ES formation

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B. Essays (50%, 共 10 題)

1. How does glycogen be metabolized and enter the glycolytic pathway? (5%)

2. Give two enzymes that require thiamine pyrophosphate (TPP) in the catalytic reaction. (4%)

3. Insulin can stimulate glycogen synthesis in the liver. Why? (5%)

4. Give 5 essential amino acids. (5%)

5. List the five coenzymes that are required for the oxidative decarboxylation of pyruvate and α-ketoglutarate. (5%)

6. Are the acetyl carbons that enter the citric acid cycle the exact same carbons that leave as CO_2? Briefly explain. (5%)

7. What is the chemiosmotic model, proposed by Peter Michell, for ATP synthesis in oxidative phosphorylation? (5%)

8. Describe two major routes to produce NADPH in mammals. (6%)

9. Describe the structure of LDL. (5%)

10. Epinephrine acts on muscles, activates the activity of cAMP-dependent protein kinase and stimulates glycolysis. However, Epinephrine acts on the liver and also activates the activity of cAMP-dependent protein kinase, but blocks glycolysis. Why? (5%)