大葉大學 九十三 學年度 **研究所碩士班** 招生考試試題紙					
系 所 別	組 別	考 試 科 目 （中 文 名 稱）	考 試 日 期	節 次	備 註
生物產業科技學系	甲組	生物化學	3 月 28 日	第二節	共 2 頁 P2-1

註：考生可否攜帶計算機或其他資料作答，請在備註欄註明（如未註明，一律不准攜帶） 10:30~12:00

I. Single choice: (2% each)

1. Glutamic acid has pKas at 2.2 (α -COOH), 4.3 (side chain) and 9.7 (α - NH_3^+). The isoelectric point of glutamic acid is
   (a) 3.25 (b) 7.0 (c) 5.4 (d) 4.3.
2. The quaternary structure of peptide associated with
   (a) the overall shape of a polypeptide chain
   (b) the sum of the secondary and tertiary interactions
   (c) simple proteins with only one subunit
   (d) the relative orientation of one polypeptide to another polypeptide in a multisubunit protein.
3. Alpha helices of peptide are stabilized primarily by
   (a) electrostatic interactions between R groups (b) hydrophobic interactions between the α -carbons of the main chain
   (c) hydrogen bonds between the main chain peptide bonds (d) hydrogen bonding between the R groups.
4. Which is not a property of D-glucose?
   (a) Its mirror image is called L-glucose (b) It is a reducing sugar
   (c) It is an epimer of L-galactose (d) In aqueous solution, it can spontaneously form pyranose ring structures.
5. Which of the following metabolic pathways is strictly anabolic?
   (a) glycolysis (b) gluconeogenesis (c) TCA cycle (d) β -oxidation of fatty acids.
6. Which of the following enzymes catalyzes an anaplerotic reaction for the TCA cycle?
   (a) pyruvate carboxylase (b) isocitrate dehydrogenase (c) α -ketoglutarate dehydrogenase (d) pyruvate dehydrogenase.
7. What statement is incorrect about the different RNA molecules?
   (a) tRNAs contain numerous intramolecular hydrogen bonds between bases
   (b) The most abundant RNA molecular in the cell is mRNA
   (c) There are more distinct tRNA molecules than there are rRNA molecules
   (d) RNAs are complexed to proteins in the ribosome.
8. Which of the following is not expected to be a characteristic of a homotetrameric allosteic enzyme?
   (a) A multisubunit enzyme (b) Effector sites are non-overlapping with the active sites
   (c) It exhibits a sigmoidal kinetic profile (d) It has only one active site per enzyme.
9. Which is not a required coenzyme for the oxidation decarboxylation of pyruvate to form acetyl-CoA?
   (a) NAD^+ (b) lipoic acid (c) ATP (d)FAD.
10. Entry of acetyl-CoA into the citric acid cycle is decreased when
    (a) the ratio of [ATP]/[ADP] is high (b) [AMP] is high
    (c) the ratio of [NAD^+]/[NADH] is high (d) NADH is rapidly oxidized through the respiratory chain.

II. Multiple choices (4% each)

1. The cofactors common to β -oxidation of fatty acids include (a) FAD (b) NAD^+ (c) GDP (d) $NADP^+$.
2. Gluconeogenesis uses which of the following enzymes to bypass three irreversible reactions of glycolysis?
   (a) pyruvate carboxylase (b) phosphoenolpyruvate carboxykinase
   (c) fructose-1, 6- bisphosphate (d) pyruvate dehydrogenase.
3. Which of the following statements about phosphofructokinase is correct?
   (a) It is a major regulatory enzyme in TCA cycle
   (b) ATP is a substrate of the enzyme
   (c) Fructose-2, 6-bisphosphate is a positive modulator of the enzyme
   (d) ATP is a negative modulator of the enzyme.

4. Enzymes can catalyze chemical reactions because enzymes
   (a) decrease the activation energy of the reaction
   (b) could affect the equilibrium point of the reaction
   (c) have specificity toward a special reactant
   (d) are consumed in the reaction
5. A peptide bond has the characteristics except
   (a) double bond property
   (b) free rotation about peptide bond
   (c) C_α, O, N and H all in peptide plane
   (d) usually in a cis configuration.
6. The oligonucleotide, AUGGp, has the properties of
   (a) composed of ribonucleotides (b) containing a 3' phosphate
   (c) having a net charged of –2 at pH 8.5 (d) containing three phosphodiester bonds.
7. The fatty acid which is described as 20:4 is (a) arachidonic acid (b) a polyunsaturated acid
   (c) with 4 double bonds (d) having the first double bond at the 4^{th} carbon from the carboxyl group.
8. Which of the following listed are the functions of polysaccharides?
   (a) protective components (b) hormone receptors (c) structural substances (d) energy storage molecules.

III. Explain briefly the following terms: (4% each)

1. Zymogens
2. Introns vs exons
3. Transcription
4. Holoenzyme
5. Michaelis's constant, Km

IV. Questions: (7% each)

1. Describe the structural differences between prokaryotic m-RNA and eukaryotic mRNA?
2. What are the reactions that can generate NADPH for fatty acid synthesis?
3. What is the "alternative RNA splicing" and what affects it may cause?
4. Please use plots (substrate concentration vs velocity) to indicate the enzyme-behavior differences between the non-allosteric inhibition and allosteric inhibition.