

# 大葉大學九十二學年度碩士班甄試試題紙

所別	組別	考試科目 (中文名稱)	考試日期	考試時間	備註
生物產業科技	乙	生物化學	12月9日	9:00-10:30	P2-1

註：備註欄若未註明可攜帶計算機或其他資料作答時，考生一律不准攜帶。

## I. True or False (2 Pts each)

1. According to the Michaelis-Menten equation, the  $v/V_{max}$  ratio is 0.25 when  $[S]=4 K_m$ .
2. The rate of glycolysis tends to increase when a large amount of pyruvate suddenly enters the cytosol of a cell.
3. Allosteric inhibitors are always structurally similar to the normal substrates for their target enzymes.
4. Pyruvate kinase, hexokinase and 6-phosphofructokinase catalyze the physiologically irreversible reactions of glycolysis
5. Citrate and ATP are positive allosteric effectors for 6-phosphofructokinase reaction
6. Intermediates of the TCA cycle can be utilized for amino acid synthesis and for gluconeogenesis.
7. If the intramitochondrial concentration of ADP is low, addition of an uncoupling agent will retard electron transport.
8. The TCA cycle itself produces reduced pyridine and flavin nucleotides but no high-energy phosphate bonds.
9. Transcriptase and reverse transcriptase both are a DNA polymerase.
10. Two tRNA molecules can have the same secondary but different primary structures.
11. All of the RNA within a cell should be able to hybridize with part of the denatured DNA from that cell.
12. Primers complimentary to the 5' ends of single-stranded DNAs can be used for PCR.
13. PRPP is an intermediate in de novo purine biosynthesis and is present in abnormally high concentrations in individuals with Lesch-Nyhan syndrome.
14. In cysteine synthesis, the hydroxyl group of serine is exchanged for the sulfhydryl group of methionine.
15. CoQ and Cytochrome C both are mobile electron carriers.

## II. Single Choice (2 Pts each)

1. Which of the following vitamins is a sulfide?  
(a) thiamin (b) biotin (c) pyridoxine (d) riboflavin (e) pantothenic acid
2. Which of the following peptides would absorb light at 280 nm?  
(a) ala-lys-his (b) ala-ala-trp (c) ser-gly-asn (d) glu-ala-lys (e) val-pro-leu
3. Which one of the following statements is not characteristic of allosteric enzymes?  
(a) They frequently catalyze a committed step early in a metabolic pathway (b) They are often composed of subunits (c) They frequently show cooperativity for substrate binding (d) They follow Michaelis-Menten kinetics (e) The binding of a positive allosteric effector results in an increase in enzyme activity
4. The positive effector in hemoglobin is  
(a) Oxygen molecule (b)  $CO_2$  (c) BPG (d)  $H^+$  (e) None of the above
5. The most effective group in effecting general acid/base in enzyme catalysis is  
(a) Asparagine (b) Serine (c) Histidine (d) Lysine
6. Which of the following statements is not a characteristic of phosphofructokinase (PFK)?  
(a) PFK is a multienzyme (b) Citrate is a negative allosteric effector of PFK (c) AMP increases the  $K_m$  of PFK for fructose-6-p (d) PFK activity is a function of energy charge in the cell
7. The glycolytic enzyme which is influenced by the hormone glucagons is  
(a) Triose phosphate isomerase (b) Hexokinase (c) Pyruvate kinase (d) Lactate Dehydrogenase
8. What is the yield of ATP in the conversion of 1 mol of glucose 6-phosphate to lactate?  
(a) 2 mol of ATP. (b) 3 mol of ATP. (c) 5 mol of ATP. (d) 6 mol of ATP. (e) 8 mol of ATP.
9. Which of the following compounds CANNOT give rise to the net synthesis of glucose?  
(a) Lactate. (b) Glycerol. (c)  $\alpha$ -Keto-glutarate. (d) Oxaloacetate. (e) Acetyl-CoA.
10. Which one of the following is NOT characteristic of the hexose monophosphate pathway?  
(a) It produces  $CO_2$ . (b) It uses  $NADP^+$  as a cofactor. (c) It requires ATP for phosphorylation. (d) It produces ribose 5-phosphate. (e) It involves the breakage and formation of C-C bonds.
11. Entry of acetyl CoA into the citric acid cycle is decreased when  
(a) the ratio of ATP/ADP is low. (b) NADH is rapidly oxidized through the respiratory chain. (c) the ratio of  $NAD^+/NADH$  is high. (d) the concentration of AMP is high. (e) The GTP/GDP ratio is high.
12. All of the following take place during the elongation steps of protein synthesis except-  
(a) An amino acid is transferred from the 3' end of a tRNA to the amino group of another amino acid. (b) Peptidyl-tRNA is transferred from the P site of the ribosome to the A site. (c) Two GTP are hydrolyzed

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生物產業科技	乙	生物化學	12月9日	9:00-10:30	P2-2

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for every amino acid incorporated into the polypeptide chain. (d) The ribosome moves on the mRNA in the 5' to 3' direction.

13. In a tRNA molecule, the sequence CCA is-  
 (a) base-paired with a UGG sequence. (b) at the 5' terminus. (c) involved in recognition of the anticodon. (d) the site of amino acid attachment.
14. Which of the following immunoglobulin classes listed below is the first antibody directed against all antigens?  
 (a) IgA (b) IgD (c) IgE (d) IgG (e) IgM
15. Which of the following will lyse cells harboring antigen?  
 (a) Macrophage (b) T helper cell (c) B cell (d) T cytotoxic cell (e) T suppressor cell (f) Basophil cell
16. What feature of the genetic code explains why some mutations are silent?  
 (a) Sequential (b) Non-overlapping (c) Non-ambiguous (d) Universal (e) Buffered
17. Each of the following is an intermediate or a product of the urea cycle except-  
 (a) ornithine. (b) arginine. (c) citrulline. (d) fumarate. (e) lysine.
18. As a result of wobble pairing-  
 (a) tRNA charging can be proofread by aminoacyl-tRNA synthetases. (b) a tRNA may be charged with several similar amino acids. (c) fewer than 61 tRNA are required to translate mRNA. (d) the genetic code is ambiguous.
19. If a given side chain of an amino acid residue has a pKa of 8.0, what portion of this residue will carry a positive charge at pH 8.0? (a) 1% (b) 9% (c) 50% (d) 91% (e) 99%
20. Methemoglobin -- (a) contains Fe<sup>3+</sup> instead of Fe<sup>2+</sup> (b) binds oxygen irreversibly (c) does not have a quaternary structure (d) is unable to bind carbon dioxide (e) is a mutant form of hemoglobin that has an altered heme binding pocket

### III. Multiple Choices (5 pts ea)

1. Which of the following statements are true about the three dimensional structure of fully oxygenated hemoglobin in vivo?  
 (a) A molecule of 2,3-P<sub>2</sub>-glycerate is located in the interior cavity. (b) An oxygen atom is bound to each of the four heme groups. (c) The ferric ions are located in the planes of the heme groups. (d) Much of its  $\alpha$ -helical conformation is lost. (e) It is a less rigid molecule than deoxyhemoglobin.
2. Which of the following statements are consistent with the fluid mosaic model of a membrane?  
 (a) A bimolecular lipid layer is viewed as a solvent for peripheral proteins. (b) Integral proteins, but not lipids, exhibit lateral diffusion. (c) All membrane proteins can exhibit transverse diffusion. (d) Enzymes are associated with it. (e) The term mosaic specifically refers to the arrangement of the lipids in a membrane. (f) Carbohydrate moieties are associated with the outside of a membrane.
3. GTP is used in what steps of protein synthesis?  
 (a) binding of aminoacyl-tRNA to elongation factor Tu (b) association of ribosomal subunits during initiation of protein synthesis (c) elongation of factor-G dependent translocation (d) action of peptidyl transferase
4. Reverse transcriptase will synthesize DNA from what templates?  
 (a) HIV genome (b) double stranded DNA (c) single stranded RNA (d) double stranded RNA (e) None of the above
5. Which of the following pairs of compounds contain members that can be readily separated from one another with gel filtration chromatography?  
 (a) Myoglobin, hemoglobin (b) HbA, HbF (c)  $\alpha$  chain of Hb,  $\beta$  chain of Hb (d) Ala, myoglobin (e) A decapeptide, myoglobin
6. Which of the following is/are true of ketogenesis?  
 (a) Its products are acetoacetate and  $\beta$ -hydroxybutyrate. (b) It is performed in liver mitochondria. (c) HMG-CoA is an intermediate. (d) The rate of ketogenesis increases during fasting.