

大葉大學 95 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 期 日 期	節 次	備 註
生物產業科技學系	甲	生物化學	4 月 23 日	第二節	共 2 頁 P1

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. Simple Choice (2% each)

- The double helical form adopted by double-stranded RNA is ____.
(A) A-form DNA (B) B-form DNA (C) Z-DNA (D) palindromic DNA (E) cruciform DNA.
- Which structure is unique to collagen?
(A) The alpha helix (B) The double helix (C) The triple helix (D) The beta structure (E) The beta barrel
- Which of following is an anomeric pair?
(A) D-glucose and L-glucose (B) D-glucose and D-fructose (C) α -D-glucose and β -D-glucose
(D) α -D-glucose and β -L-glucose (E) D-glucose and L-fructose
- Which of these is a main precursor of steroids?
(A) Stearic acid (B) Cholesterol (C) Isoprene (D) Acetic acid (E) Amino acid
- What is an 'essential amino acid'?
(A) One that is necessary in every polypeptide synthesised.
(B) One that can't be made in the body or produced by transamination.
(C) One we need more of than some others (D) A common one. (E) A rare one.
- What does 'in vivo' refer to?
(A) In theory, theoretically. (B) In practice, actually. (C) In glass, in laboratory situation.
(D) In living tissues, or in the body. (E) In dead tissues.
- Which tripeptide is most negatively charged at pH 7?
(A) Tyr-Lys-Met (B) Gly-Pro-Arg (C) Asp-Trp-Tyr (D) Asp-His-Glu (E) Leu-Val-Phe
- When two carbohydrates are epimers:
(A) one is in the chair conformation and the other in the boat conformation. (B) they differ in length by one carbon.
(C) one is an aldose, the other a ketose. (D) one is a pyranose, the other a furanose.
(E) they differ in the configuration around one carbon atom.
- In myoglobin, heme is an example of
(A) a secondary structure. (B) a modified amino acid. (C) a chaperone. (D) a prosthetic group. (E) a beta-sheet.
- Which of the following amino acids has a side chain capable of being a good nucleophile?
(A) phenylalanine (B) serine (C) arginine (D) glycine (E) leucine
- An enzyme used in both glycolysis and gluconeogenesis is:
(A) 3-phosphoglycerate kinase. (B) glucose 6-phosphatase. (C) hexokinase. (D) phosphofructokinase-1. (E) pyruvate kinase.
- Which of the following statements about the pentose phosphate pathway is *incorrect*?
(A) It generates CO₂ from C-1 of glucose. (B) It involves the conversion of an aldohexose to an aldopentose.
(C) It is prominent in lactating mammary gland. (D) It is principally directed toward the generation of NADPH.
(E) It requires the participation of molecular oxygen.
- Glycogen phosphorylase *a* can be inhibited at an allosteric site by:
(A) AMP. (B) calcium. (C) GDP. (D) glucagon. (E) glucose.
- The glyoxylate cycle is:
(A) a means of using acetate for both energy and biosynthetic precursors.
(B) an alternative path of glucose metabolism in cells that do not have enough O₂.
(C) defective in people with phenylketonuria.
(D) is not active in a mammalian liver.
(E) the most direct way of providing the precursors for synthesis of nucleic acids (e.g., ribose).
- Which substance is *not* involved in the production of urea from NH₄⁺ via the urea cycle?
(A) Aspartate (B) ATP (C) Carbamoyl phosphate (D) Malate (E) Ornithine
- Cholesterol is synthesized from:
(A) acetyl-CoA. (B) choline. (C) lipoic acid. (D) malate. (E) oxalate.

大葉大學 95 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 期 日 期	節 次	備 註
生物產業科技學系	甲	生物化學	4 月 23 日	第二節	共 2 頁 P2

17. In amino acid catabolism, the first reaction for many amino acids is a(n):
 (A) decarboxylation requiring thiamine pyrophosphate (TPP). (B) hydroxylation requiring NADPH and O₂.
 (C) oxidative deamination requiring NAD⁺. (D) reduction requiring pyridoxal phosphate (PLP).
 (E) transamination requiring pyridoxal phosphate (PLP).
18. During oxidative phosphorylation, the proton motive force that is generated by electron transport is used to:
 (A) create a pore in the inner mitochondrial membrane. (B) generate the substrates (ADP and P_i) for the ATP synthase.
 (C) induce a conformational change in the ATP synthase. (D) oxidize NADH to NAD⁺.
 (E) reduce O₂ to H₂O.
19. The rate-limiting step in fatty acid synthesis is:
 (A) condensation of acetyl-CoA and malonyl-CoA. (B) formation of acetyl-CoA from acetate.
 (C) formation of malonyl-CoA from malonate and coenzyme A. (D) the reaction catalyzed by acetyl-CoA carboxylase.
 (E) the reduction of the acetoacetyl group to a β-hydroxybutyryl group.
20. The reaction of the citric acid cycle that is most similar to the pyruvate dehydrogenase complex-catalyzed conversion of pyruvate to acetyl-CoA is the conversion of:
 (A) citrate to isocitrate. (B) fumarate to malate. (C) malate to oxaloacetate.
 (D) succinyl-CoA to succinate. (E) α-ketoglutarate to succinyl-CoA.

II. Simple Problems(each 6%)

- What two amino acids are most suited to beta-turns?
- Which three amino acids absorb light in the ultraviolet region of the spectrum above 250 nm?
- Chargaff's rules provided an important clue to solve the structure of DNA. What are Chargaff's rules?
- DNA and RNA react differently to acid and base conditions. Explain.
- The pK_a of acetic acid is 4.76. If 25% of the acetic acid in a 0.1 M solution is in the protonated state, what is the pH of the solution? [log2=0.30; log3=0.48; log5=0.70]
- Rat liver is able to metabolize glucose by both the glycolytic and the pentose phosphate pathways. Indicate the following are properties of glycolytic (G), pentose phosphate (P), both (G + P), or neither (0):
 (a) NAD⁺ is involved. (b) CO₂ is liberated. (c) Phosphate esters are intermediates.
 (d) Glyceraldehyde 3-phosphate is an intermediate. (e) Fructose 6-phosphate is an intermediate.
- The citric acid cycle begins with the condensation of acetyl-CoA with oxaloacetate. Describe three possible sources for the acetyl-CoA.
- The citric acid cycle is frequently described as the major pathway of aerobic catabolism, which means that it is an oxygen-dependent degradative process. However, none of the reactions of the cycle directly involves oxygen as a reactant. Why is the pathway oxygen-dependent?
- During starvation, more urea production occurs. Explain this observation
- Match the cofactors below with their roles in the pyruvate dehydrogenase complex reaction.

<p><u>Cofactors:</u></p> <ol style="list-style-type: none"> Coenzyme A (CoA-SH) NAD⁺ Thiamine pyrophosphate (TPP) FAD Lipoic acid in oxidized form 	<p><u>Roles:</u></p> <ol style="list-style-type: none"> Attacks and attaches to the central carbon in pyruvate. Oxidizes FADH₂. Accepts the acetyl group from reduced lipoic acid. Oxidizes the reduced form of lipoic acid. Initial electron acceptor in oxidation of pyruvate.
--	--