

大葉大學 102 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	生物化學	3月23日	第一節 10:30~12:00	共2頁 第1頁

說明 I: 可否攜帶特殊作答輔助工具: 否 是, 考生可使用 _____ (如未註明, 一律不准攜帶)

Simple Choice; 1~30, 每題 2 分

- What is the approximate molecular weight of a protein composed of 330 amino acids?
(A) 36.3 daltons (B) 36.3 kilodaltons (C) 3.3 daltons (D) 3.3 kilodaltons
- What is the isoelectric point (pI) of glutamic acid? The pK_1 , pK_2 , and pK_R for glutamic acid are 2.2, 9.6, and 4.2, respectively. (A) 6.9 (B) 3.2 (C) 5.3 (D) 5.9
- Prosthetic groups in the class of proteins known as glycoproteins are composed of _____.
(A) phosphates (B) lipids (C) metals (D) carbohydrates
- In a mixture of four proteins with different size, which one should elute first in size-exclusion (gel- filtration) chromatography? (A) 380 kDa (B) 145 kDa (C) 250 kDa (D) 60 kDa
- Which one of the following amino acids is much less soluble in water? (A) E (B) F (C) K (D) R
- The reference compound for naming D and L isomers of sugars is _____. (A) sucrose (B) glyceraldehyde (C) formaldehyde (D) ribose
- Which of following is an anomeric pair? (A) D-glucose and D-fructose (B) D-glucose and L-glucose (C) α -D-glucose and β -D-glucose (D) α -D-glucose and β -L-glucose
- Which of the following is *not* a reducing sugar? (A) Glyceraldehyde (B) Sucrose (C) Glucose (D) Fructose
- From the abbreviated name of the compound Gal(β 1 \rightarrow 4)Glc, we know that _____.
(A) the galactose residue is at the reducing end. (B) the glucose is in its pyranose form.
(C) the glucose residue is the β anomer. (D) C-4 of glucose is joined to C-1 of galactose by a glycosidic bond.
- Which of the following is a heteropolysaccharide? (A) Chitin (B) Glycogen (C) Cellulose (D) Hyaluronate
- Which of the following is a coenzyme? (A) Cu^{2+} (B) Trypsin (C) NAD^+ (D) Myoglobin
- Which of the following amino acids is capable of acting as a general acid or general base at physiological pH?
(A) Histidine (B) Tryptophan (C) Tyrosine (D) Glycine
- Which of the following is a nonstandard amino acid? (A) Cysteine (B) Valine (C) Glycine (D) Hydroxyproline
- α helix is associated with what level of protein structure? (A) Primary (B) Secondary (C) Tertiary (D) Quaternary
- A polypeptide has a high pI value. Which of the following amino acids are likely to be present?
(A) Serine (B) Valine (C) Aspartate (D) Arginine
- Which enzyme is not a regulatory enzyme in the glycolysis? (A) hexokinase (B) phosphofructokinase (C) phosphoglycerate kinase (D) pyruvate kinase
- Fructose 2,6-bisphosphate is a potent activator in enzyme of _____. (A) hexokinase (B) phosphofructokinase (C) phosphoglycerate kinase (D) pyruvate kinase
- The phosphorylations in the glycolysis are _____. (A) substrate-level phosphorylation (B) oxidative phosphorylation (C) inorganic phosphorylation (D) both substrate-level and oxidative phosphorylation
- The synthesis of glucose from noncarbohydrate precursors is called _____. (A) glycolysis (B) Krebs cycle (C) pentose phosphate pathway (D) gluconeogenesis
- Phosphoenolpyruvate formed from pyruvate in the gluconeogenesis is catalyzed by _____. (A) pyruvate carboxylase and phosphoenolpyruvate carboxykinase (B) pyruvate kinase and phosphoenolpyruvate carboxykinase (C) pyruvate carboxylase and hexokinase (D) pyruvate carboxylase and phosphofructokinase
- Pyruvate is oxidatively decarboxylated to form acetyl CoA is catalyzed by _____. (A) phosphoenolpyruvate carboxykinase (B) pyruvate kinase (C) pyruvate decarboxylase (D) pyruvate dehydrogenase complex
- Which on is not required coenzymes in the synthesis of acetyl coenzyme A from pyruvate?
(A) $NADP^+$ (B) FAD (C) lipoic acid (D) thiamine pyrophosphate
- Two carbon atoms are lost as CO_2 in the citric acid cycle. The catalytic enzymes are _____.
(A) isocitric dehydrogenase and malate dehydrogenase (B) isocitric dehydrogenase and α -ketoglutarate dehydrogenase complex (C) fumerase and α -ketoglutarate dehydrogenase complex (D) succinate dehydrogenase and malate dehydrogenase
- The citric acid cycle can be written simply as
(A) $acetyl\ CoA + 3NADP^+ + FAD + GDP \rightarrow 2C\ O_2 + 3NADH + FADH_2 + GTP$
(B) $acetyl\ CoA + 2NAD^+ + 2FAD + GDP \rightarrow 2C\ O_2 + 2NADH + 2FADH_2 + GTP$
(C) $acetyl\ CoA + 3NAD^+ + FAD + GDP \rightarrow 2CO_2 + 3NADH + FADH_2 + GTP$
(D) $acetyl\ CoA + NAD^+ + 3FAD + GDP \rightarrow 2CO_2 + NADH + 3FADH_2 + GTP$

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25. The correct transfer sequence of electrons from NADH to O₂ is ____.
- (A) NADH-Q oxidoreductase, cytochrome c oxidase and Q-cytochrome c oxidoreductase
 (B) cytochrome c oxidase, NADH-Q oxidoreductase, and Q-cytochrome c oxidoreductase
 (C) cytochrome c oxidase, Q-cytochrome c oxidoreductase and NADH-Q oxidoreductase
 (D) NADH-Q oxidoreductase, Q-cytochrome c oxidoreductase and cytochrome c oxidase
26. The electron transfer reactions in mitochondria during oxidative phosphorylation will cause the proton pump. The pump direction and the pump number of proton are respectively as ____.
- (A) from intermembrane space to matrix, 10 (B) from matrix to intermembrane space, 10
 (C) from intermembrane space to matrix, 6 (D) from matrix to intermembrane space, 6
27. The respiratory chain and ATP synthase are biochemically separate systems, linked by ____.
- (A) electron-motive force (B) nuclear-motive force (C) proton-motive force
 (D) both electron-motive force and proton-motive force
28. The breakdown of glycogen is from ____.
- (A) the nonreducing ends of the glycogen molecules (B) the reducing ends of the glycogen molecules (C) the middle of the glycogen molecules (D) both the reducing and nonreducing ends
29. The activated glucose donor in the glycogen synthesis is ____.
- (A) glucose (B) UDP-glucose (C) ADP-glucose (D) UTP-glucose
30. The main products in the pentose phosphate pathway are ____.
- (A) NADPH (B) five-carbon sugars
 (C) NADH and five-carbon sugars (D) NADPH and five-carbon sugars

Match problems; I-IV, 每題組 10 分

(I) Match each amino acid in Questions 31-35 with the appropriate side-chain type in the right-hand column.

- | | |
|---------------|-------------------------|
| 1. Isoleucine | (A) sulfur-containing |
| 2. Tryptophan | (B) acidic |
| 3. Methionine | (C) hydroxyl-containing |
| 4. Aspartate | (D) nonpolar aliphatic |
| 5. Serine | (E) nonpolar aromatic |

(II) Match the biological roles described in Questions 36-40 with the molecules in the right-hand column.

- | | |
|------------------------------------------------|-------------------|
| 1. exoskeleton of insects | (A) cellulose |
| 2. structural component of bacterial cell wall | (B) chitin |
| 3. structural component of plant cell walls | (C) starch |
| 4. extracellular matrix of animal tissues | (D) peptidoglycan |
| 5. carbohydrate storage in plants | (E) proteoglycan |

(III) What enzymes are participated in the conversion of glucose to pyruvate via glycolysis,?

- Which catalyze the reactions in which ATP is produced? ____ and ____
- Which catalyzes the reaction in which NADH is produced? ____
- Which catalyze the reactions in which ATP is consumed? ____ and ____

- (A) hexokinase (B) phosphoglycerate kinase (C) phosphofructokinase
 (D) glyceraldehyde 3-phosphate dehydrogenase (E) pyruvate kinase

(IV) The following questions are concerned the degradation of lipids.

- Which catalyzes the degradation of triacylglycerol and glycerol? ____
- What hormones induce lipolysis? ____ and ____
- Which catalyzes the activated fatty acids to transport across the mitochondrial membrane? ____
- Another fuel source derived from fats. ____

- (A) epinephrine (B) ketone bodies (C) lipase (D) glucagon (E) carnitine acyltransferase I