大葉大學 101 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 17 日	第 一 節	共 2 頁 P1 10:30~12:00

選擇題 (每題 2 分，共 100 分) 說明 1：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）

1. Which one of the common amino acids has no free α-amino group?
   (A) D-glycine (B) L-glycine (C) D-proline (D) L-proline
2. Which one of the following amino acids (presented as one-letter abbreviation) is much less soluble in water? (A) D (B) E (C) F (D) K
3. Which one of the following amino acid residues would you most likely find on the exterior surface of a globular protein at physiological pH? (A) Leu (B) Ala (C) Met (D) Glu
4. Which one of the following amino acids would cause a kink or a bend in the polypeptide backbone? (A) Ala (B) Gly (C) Trp (D) Pro
5. Which is NOT true for the following proteins: collagen, hemoglobin, myoglobin? (A) They all have primary structure.
   (B) They all have secondary structure. (C) They all have tertiary structure. (D) They all have quaternary structure.
6. Which structure is unique to collagen? (A) The beta structure (B) The double helix (C) The triple helix (D) The alpha helix
7. In myoglobin, heme is an example of (A) a secondary structure. (B) a modified amino acid. (C) a chaperone. (D) a prosthetic group.
8. Which three amino acids absorb light in the unltraviolet region of the spectrum above 250 nm?
   (A) Leu, Ile, Val (B) Pro, Phe, Gly (C) Phe, Tyr, Trp (D) Leu, Gly, Trp
9. According to the kinetic analysis of a Michaelis-Menten enzyme, what is the K_m for the enzyme?

V_0 (μmol/min)	Substrate added (mM)
211	4
313	8
338	16
422	32
628	1000

   (A) 4 mM (B) 8 mM (C) 16 mM (D) 32 mM
10. In hemoglobin, the transition from T state to R state (low to high affinity) is triggered by
    (A) Fe^{2+} binding. (B) heme binding. (C) oxygen binding. (D) subunit association.
11. The concept of "induced fit" refers to the fact that
    (A) enzyme specificity is induced by enzyme-substrate binding.
    (B) substrate binding may induce a conformational change in the enzyme, which then brings catalytic groups into proper orientation.
    (C) enzyme-substrate binding induces an increase in the reaction entropy, thereby catalyzing the reaction.
    (D) when a substrate binds to an enzyme, the enzyme induces a loss of water (desolvation) from the substrate.
12. A small molecule that decreases the activity of an enzyme by binding to a site other than the catalytic site is termed a(n)
    (A) allosteric inhibitor. (B) alternative inhibitor. (C) competitive inhibitor. (D) transition-state analog.
13. Of the 20 standard amino acids, which one is NOT optically active?
    (A) Pro (B) Cys (C) Gly (D) His
14. The dominant form of an amino acid at pH 13 is
    (A) NH_2—CHR—COOH. (B) NH_2—CHR—COO^-. (C) NH_3^+—CHR—COOH. (D) NH_3^+—CHR—COO^-.
15. At the isoelectric pH of a tripeptide,
    (A) only the amino and carboxyl termini contribute charge. (B) the amino and carboxyl termini are not charged.
    (C) the total net charge is zero. (D) the internal amino acid of the peptide cannot have an ionizable R group.
16. Which of following is an anomeric pair?
    (A) α-D-glucose and β-L-glucose (B) α-D-glucose and β-D-glucose (C) D-glucose and D-fructose (D) D-glucose and L-glucose
17. When two carbohydrates are epimers,
    (A) one is in the chair conformation and the other is in the boat conformation. (B) they differ in length by one carbon.
    (C) one is an aldose, the other is a ketose. (D) they differ in the configuration around one carbon atom.
18. Which of the following is heteropolysaccharide? (A) Hyaluronate (B) Glycogen (C) Cellulose (D) Chitin
19. Which of the following monosaccharides is ketose? (A) ribose (B) fructose (C) glucose (D) glyceraldehyde
20. The reference compound for naming D and L isomers of sugars is (A) fructose (B) glyceraldehydes (C) glucose (D) sucrose
21. Which of the following pairs is interconverted in the process of mutarotation?
    (A) α-D-glucose and β-D-glucose (B) D-glucose and D-glucosamine (C) D-glucose and D-fructose (D) D-glucose and L-glucose
22. Starch and glycogen are both polymers of
    (A) α-D-glucose. (B) β-D-glucose. (C) glucose 6-phosphate. (D) glucose 1-phosphate.
23. Which of the following is NOT a reducing sugar? (A) Fructose (B) Glucose (C) Glyceraldehyde (D) Sucrose
24. The compound that consists of ribose linked by an *N*-glycosidic bond to N-9 of adenine is
    (A) adenosine. (B) adenosine monophosphate. (C) a deoxyribonucleoside. (D) a purine nucleotide.
25. Which property of lipid molecules allows membranes to act as effective barriers to polar molecules? (A) as intracellular messengers
    (B) as highly reduced forms of carbon (C) as amphipathic molecules (D) containing unsaturated fatty acids.
26. Which of the following is a cofactor in the reaction catalyzed by glyceraldehyde 3-phosphate dehydrogenase?
    (A) ATP (B) Cu^{2+} (C) heme (D) NAD^+
27. Glycogen is converted to monosaccharide units by:
    (A) glucokinase. (B) glucose-6-phosphatase (C) glycogen phosphorylase. (D) glycogen synthase.
28. Which of the following compounds *cannot* serve as the starting material for the synthesis of glucose via gluconeogenesis?
    (A) acetate (B) glycerol (C) lactate (D) oxaloacetate

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29. An enzyme used in both glycolysis and gluconeogenesis is:
(A) 3-phosphoglycerate kinase. (B) hexokinase. (C) phosphofructokinase-1. (D) pyruvate kinase.
30. The main function of the pentose phosphate pathway is to:
(A) give the cell an alternative pathway should glycolysis fail. (B) supply pentoses and NADPH.
(C)supply energy. (D) supply NADH.
31. Cellular isozymes of pyruvate kinase are allosterically inhibited by:
(A) high concentrations of AMP. (B) high concentrations of ATP.
(C) high concentrations of citrate. (D) low concentrations of acetyl-CoA.
32. The enzyme glycogen phosphorylase:
(A) catalyzes a cleavage of $\beta(1\rightarrow4)$ bonds. (B) is a substrate for a kinase.
(C) catalyzes a hydrolytic cleavage of $\alpha(1\rightarrow4)$ bonds. (D)uses glucose 6-phosphate as a substrate.
33. Glycogenin
(A) catalyzes the conversion of starch into glycogen. (B) is the enzyme responsible for forming branches in glycogen.
(C) is the gene that encodes glycogen synthase. (D) is the primer on which new glycogen chains are initiated.
34. Which of the below is *not* required for the oxidative decarboxylation of pyruvate to form acetyl-CoA?
(A) ATP (B) CoA-SH (C) FAD (D) Lipoic acid
35. Which of the following is *not* an intermediate of the citric acid cycle?
(A) Citrate (B) Oxaloacetate (C) α-Ketoglutarate (D) Acetyl-CoA
36. Conversion of 1 mol of acetyl-CoA to 2 mol of CO_2 and CoA via the citric acid cycle results in the net production of:
(A) 1 mol of citrate (B) 1 mol of $FADH_2$ (C) 1 mol of NADH (D) 7 mol of ATP
37. 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) α-ketoglutarate to succinyl-CoA. (D) succinyl-CoA to succinate.
38. All of the oxidative steps of the citric acid cycle are linked to the reduction of NAD^+ *except* the reaction catalyzed by:
(A) isocitrate dehydrogenase. (B) malate dehydrogenase. (C)pyruvate dehydrogenase. (D) succinate dehydrogenase.
39. The conversion of 1 mol of pyruvate to 3 mol of CO_2 via pyruvate dehydrogenase and the citric acid cycle also yields ___ mol of NADH, ___ mol of $FADH_2$, and ___ mol of ATP (or GTP). (A) 2; 2; 2 (B) 3; 1; 1 (C) 3; 2; 0 (D) 4; 1; 1
40. During seed germination, the glyoxylate pathway is important to plants because it enables them to:
(A) carry out the net synthesis of glucose from acetyl-CoA.
(B) form acetyl-CoA from malate.
(C) get rid of isocitrate formed from the aconitase reaction.
(D) obtain glyoxylate for cholesterol biosynthesis.
41. The glycerol produced from the hydrolysis of triacylglycerides enters glycolysis as:
(A) glucose (B) glucose-6-phosphate. (C) dihydroxyacetone phosphate. (D) pyruvate.
42. Transport of fatty acids from the cytoplasm to the mitochondrial matrix requires:
(A) ATP, coenzyme A, and hexokinase.
(B) ATP, carnitine, and coenzyme A.
(C) carnitine, coenzyme A, and hexokinase.
(D) ATP, coenzyme A, and pyruvate dehydrogenase.
43. What is the correct order of function of the following enzymes of oxidation?
1. β - Hydroxyacyl-CoA dehydrogenase 2. Thiolase
3. Enoyl-CoA hydratase 4 . Acyl-CoA dehydrogenase
(A) 1, 2, 3, 4 (B) 3, 1, 4, 2 (C) 4, 3, 1, 2 (D) 1, 4, 3, 2
44. Which enzyme is the major regulatory control point for β-oxidation?
(A) pyruvate carboxylase (B) carnitine acyl transferase I
(C) acetyl CoA dehydrogenase (D) enoyl CoA isomerase
45. The major site of formation of acetoacetate from fatty acids is the:
(A) liver. (B) intestinal mucosa. (C) kidney. (D) muscle.
46. Urea synthesis in mammals takes place primarily in tissues of the:
(A) brain. (B) kidney. (C) liver. (D) skeletal muscle.
47. In the urea cycle, ornithine transcarbamoylase catalyzes:
(A) cleavage of urea to ammonia.
(B) formation of citrulline from ornithine and another reactant.
(C) formation of urea from arginine.
(D) transamination of arginine.
48. Which one is the final electron acceptor in the electron-transfer reactions in mitochondria? (A) O_2 (B) N_2 (C) CO_2 (D) H_2O
49. Chemiosmotic model is the paradigm for the mechanism in the
(A) glucose degradation (B) glycogen synthesis
(C) fatty acid degradation (D) ATP synthesis
50. Which one is the most active pattern to carry the cytosolic NADH into mitochondria in liver, kidney and heart?
(A) malate-aspartate shuttle (B) glycerol 3-phosphate shuttle
(C) aspartate-argininosuccinate shunt (D) alanine cycle