大葉大學 **95** 學年度 **研究所碩士班甄試** 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		生物化學	12 月 19 日	第一節	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）

背面有試題

I. Simple Choice (2% each)

1. Amino acids are ampholytes because they can function as either a(n)
   A) acid or a base. B) neutral molecule or an ion. C) polar or a nonpolar molecule.
   D) standard or a nonstandard monomer in proteins. E) transparent or a light-absorbing compound.
2. The reaction in formation of a peptide bond between two amino acids is a(n)
   A) cleavage B) condensation C) group transfer D) isomerization E) oxidation-reduction
3. The relationship between the concentration of oxygen and the fraction of binding sites occupied in the binding of oxygen to myoglobin can best be described as:
   A) sigmoidal. B) linear with a negative slope. C) linear with a positive slope. D) random. E) hyperbolic.
4. 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. E) subunit dissociation.
5. Enzymes are potent catalysts because they
   A) are consumed in the reactions they catalyze.
   B) are very specific and can prevent the conversion of products back to substrates.
   C) drive reactions to completion while other catalysts drive reactions to equilibrium.
   D) increase the equilibrium constants for the reactions they catalyze.
   E) lower the activation energy for the reactions they catalyze.
6. The number of substrate molecules converted to product in a given unit of time by a single enzyme molecule at saturation is referred to as
   A) dissociation constant. B) half-saturation constant. C) maximum velocity. D) turnover number. E) Michaelis-Menten number.
7. The DNA oligonucleotide abbreviated pATCGAC:
   A) has 7 phosphate groups. B) has a hydroxyl at its 3′ end. C) has a phosphate on its 3′ end.
   D) has an A at its 3′ end. E) violates Chargaff's rules.
8. Compounds that generate nitrous acid (such as nitrites, nitrates, and nitrosamines) change DNA molecules by:
   A) breakage of phosphodiester bonds. B) deamination of bases. C) depurination.
   D) formation of thymine dimers. E) transformation of A → T.
9. Which of the following enzymes acts in the pentose phosphate pathway?
   A) 6-phosphogluconate dehydrogenase B) Aldolase C) Glycogen phosphorylase
   D) Phosphofructokinase-1 E) Pyruvate kinase
10. The glycogen-branching enzyme catalyzes:
   A) degradation of (α1 → 4) linkages in glycogen B) formation of (α1 → 4) linkages in glycogen.
   C) formation of (α1 → 6) linkages during glycogen synthesis. D) glycogen degradation in tree branches.
   E) removal of unneeded glucose residues at the ends of branches.
11. Which one of the following enzymatic activities would be decreased by thiamine deficiency?
   A) Fumarase B) Isocitrate dehydrogenase C) Malate dehydrogenase
   D) Succinate dehydrogenase E) α-Ketoglutarate dehydrogenase complex
12. The reaction of the citric acid cycle that produces an ATP equivalent (in the form of GTP) by substrate level phosphorylation is the conversion of:
   A) citrate to isocitrate. B) fumarate to malate. C) malate to oxaloacetate.
   D) succinate to fumarate. E) succinyl-CoA to succinate.
13. Which of the following cofactors is required for the conversion of succinate to fumarate in the citric acid cycle?
   A) ATP B) Biotin C) FAD D) NAD^+ E) $NADP^+$
14. 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 O_2.
   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).
15. 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. E) α-ketoglutarate dehydrogenase complex.
16. If an aerobic organism (e.g., the bacterium *E. coli*) were fed each of the following three compounds as a source of energy, the energy yield per mole from these molecules would be in the order:
   A) alanine > glucose > palmitate (16:0) B) glucose > alanine > palmitate C) glucose > palmitate > alanine
   D) palmitate > glucose > alanine E) palmitate > alanine > glucose
17. Transamination from alanine to α-ketoglutarate requires the coenzyme:
   A) biotin. B) NADH. C) No coenzyme is involved.
   D) pyridoxal phosphate (PLP). E) thiamine pyrophosphate (TPP).

背面有試題

18. 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.

19. Which of these can be synthesized by plants but *not* by humans?
A) Linoleate [18:2($\Delta^{9,12}$)] B) Palmitate (16:0) C) Phosphatidylcholine D) Pyruvate E) Stearate (18:0)

20. The maturation of insulin from its precursor (preproinsulin) involves:
A) acetylation. B) oxidation. C) phosphorylation. D) proteolysis. E) reduction.

II. Multiple Choices (4% each)

1. An average protein will be denatured by:
A) urea. B) heating to 90°C. C) iodoacetic acid. D) pH 10.

2. The steps of glycolysis between glyceraldehyde 3-phosphate and 3-phosphoglycerate involve all of the following *except:*
A) utilization of P_i. B) ATP consumption. C) oxidation of NADH to NAD^+. D) the formation of 1,3-bisphosphoglycerate.

3. Transport of fatty acids from the cytoplasm to the mitochondrial matrix requires:
A) pyruvate dehydrogenase B) ATP C) Carnitine D) coenzyme A.

4. Which substance(s) is/are involved in the production of urea from NH_4^+ via the urea cycle?
A) Aspartate and Ornithine B) GTP C) Malate D) Carbamoyl phosphate

5. Cyanide, oligomycin, and 2,4-dinitrophenol (DNP) are inhibitors of mitochondrial aerobic phosphorylation. Which of the following statements correctly describes the mode of action of the three inhibitors?
A) Cyanide and 2,4-dinitrophenol inhibit the respiratory chain.
B) Cyanide inhibits the respiratory chain.
C) Cyanide, oligomycin, and 2,4-dinitrophenol compete with O_2 for cytochrome oxidase (Complex IV).
D) Oligomycin and 2,4-dinitrophenol inhibit the synthesis of ATP.

6. The alkaline hydrolysis of RNA will produce:
A) 2′- AMP. B) 2′,3′-cGMP. C) 2′-CMP. D) 3′,5′-cAMP.

III. Questions

1. An enzyme follows Michaelis-Menten kinetics. Indicate which of the kinetic parameters would be altered by the following factors:
(a) a competitive inhibitor (b) a mixed inhibitor (c) 6M urea (d) doubling [S]
Give only one answer (K_m, V_{max}, both or neither) for each. (8%)

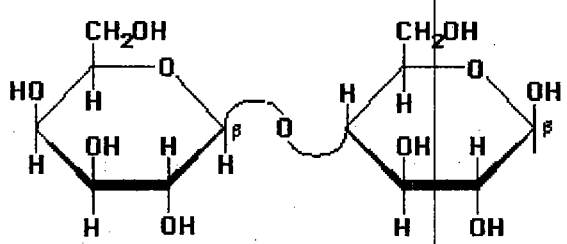
2. Match the type of bond in the nucleotide with the role below. Please show answers as "(a) for (1)" or "(a) - (1)". (8%)

Bond type	Role
(a) phosphodiester	(1) links base to pentose in nucleotide
(b) *N*-glycosidic	(2) joins adjacent nucleotides in one strand
(c) phosphate ester	(3) joins complementary nucleotides in two strands
(d) hydrogen	(4) difference between a nucleoside and a nucleotide

3. Although molecular oxygen (O_2) does not participate directly in any of the reactions of the citric acid cycle, the cycle operates only when O_2 is present. Explain this observation. (5%)

4. Describe the three sites in the electron transport chain responsible for pumping hydrogen ions out of the mitochondria during electron transport. (9%)

5. In the following structure:



(a) How many of the monosaccharide units are furanoses and how may are pyranoses?
(b) What is the linkage between the two monosaccharide units?
(c) Is this a reducing sugar?
Explain. (6 %)