

# 慈濟大學 101 學年度 研究所碩士班招生考試命題紙

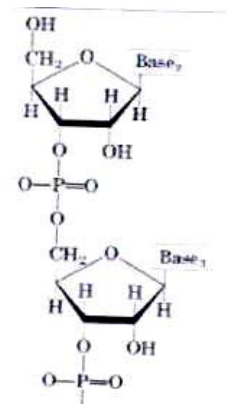
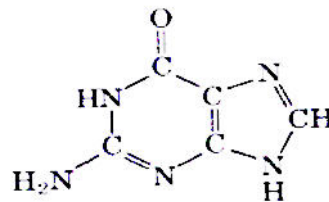
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電腦閱卷，請用 2B 鉛筆將答案填入答案卡，考試終止時試卷與答案卡同時繳回

一. 單選題，每題 2.5 分，共 40 題，答錯不倒扣。

- 核酸分子中，核苷酸(nucleotide)間的鍵結為：  
(A) non-covalent bond (B) peptide bond  
(C) disulfide linkage (D) phosphodiester linkage
- 當雙股 DNA 變性成為單股時，其  $OD_{260\text{ nm}}$  的吸光值：  
(A) 增加 (B) 減少 (C) 不變 (D) 無法測出
- 在原核生物中，下列那一種 DNA polymerase 具有真正複製的功能(而非修補功能)？  
(A) DNA pol II (B) DNA pol III (C) DNA pol I (D) DNA ligase
- 紫外線(UV)過度照射，通常對去氧核酸(DNA)造成何種傷害？  
(A) depurination (B) pyrimidine dimer (C) deamination (D) strand break
- 在各種 DNA 修補機制中，uracil glycosylase 的修補機制屬於：  
(A) mismatch repair (B) direct repair  
(C) nucleotide excision repair (D) base excision repair
- The structure shown in the right is:  
(A) a pyrimidine nucleoside  
(B) guanine  
(C) deoxyguanosine  
(D) a purine nucleotide  
(E) thymidine
- The molecule shown in the right is:  
(A) RNA  
(B) DNA  
(C) fatty acid  
(D) protein
- Which of the following is not the basic rule for DNA replication?  
(A) from N-terminal to C-terminal  
(B) one origin and bidirection  
(C) 5' to 3' and semidiscontinuous  
(D) semiconservation
- 下列那一種不是 DNA recombination 的種類？  
(A) general recombination (B) direct repair  
(C) transposon (D) site-specific recombination



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10. 那一種 DNA 結構具左旋的特性？  
(A) A form (B) Z form (C) B form (D)  $\alpha$ -helix
11. 下列那一種酵素未參與 DNA 合成？  
(A) DNA ligase (B) photolyase  
(C) single-stranded binding protein (D) DNA polymerase I
12. 下列那一種 RNA polymerase 存在核仁(nucleolus)中，負責 rRNA 的製造？  
(A) RNA pol III (B) RNA pol II (C) mitochondrial RNA polymerase (D) RNA pol I
13. 下列何種抗生素因具有類似 changed tRNA 的結構，而有抑制蛋白質合成的功能？  
(A) tetracycline (B) cycloheximide  
(C) streptomycin (D) puromycin
14. 在 DNA-protein interaction 中，最常發現辨識 A=T 配對的胺基酸為  
(A) Gln (B) Arg (C) Asp (D) Met
15. 在分析單一蛋白質的胺基酸組成時，須先把蛋白質水解成胺基酸，請問以下何種胺基酸的含量，不能直接測得？  
(A) Glu (B) Asp (C) Gly (D) Gln
16. 構型(conformation)通常是指蛋白的  
(A) 1 級結構 (B) 2 級結構 (C) 3 級結構 (D) 4 級結構
17. 某酵素 X 催化右列反應： $L\text{-Alanine} \rightleftharpoons D\text{-Alanine}$ ，請問此酵素最可能需要以下何種輔酶？(A) B<sub>1</sub> (B) B<sub>2</sub> (C) B<sub>6</sub> (D) B<sub>12</sub>
18. 以下何者是酵素動力學常數  $k_{cat}$  的單位？  
(A) mM/sec (B) 1/sec (C) 1/mM·min (D) mM·min
19. 圓二色光譜(Circular Dichroism)可決定蛋白質的  
(A) 1 級結構 (B) 2 級結構 (C) 3 級結構 (D) 4 級結構
20. 將蛋白質接上磷酸根，是一種調節蛋白活性的方式，請問磷酸根通常接在蛋白質哪個胺基酸上？  
(A) Tyr (B) Cys (C) Lys (D) Gly
21. 請問下列胺基酸何者具有苯環？  
(A) Asp (B) Thr (C) Trp (D) Ser
22. Edman degradation 可決定蛋白質的  
(A) 1 級結構 (B) 2 級結構 (C) 3 級結構 (D) 4 級結構
23. 下列胺基酸何者參與蛋白質雙硫鍵(disulfide bond)的形成？  
(A) Cys (B) Met (C) Pro (D) Glu
24. 膠體過濾法(gel filtration)是根據蛋白質何種性質不同，達到分離的目的  
(A) 淨電荷 (B) 分子量 (C) 疏水性 (D) 以上皆非
25. 當競爭型抑制劑(competitive inhibitor)出現時，下列何項酵素動力學常數不會改變？  
(A)  $k_{cat}/K_m$  (B)  $K_m$  (C)  $V_{max}$  (D) 以上皆非
26. 對醣蛋白而言，多醣最可能接在以下那一個胺基酸上？  
(A) Cys (B) Asn (C) Tyr (D) Lys

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27. 血紅蛋白含有何種金屬離子?  
(A) 鈷 (B) 鎂 (C) 鐵 (D) 銅
28. In comparing fatty acid biosynthesis with  $\beta$ -oxidation of fatty acids, which of the following statements is *incorrect*?  
(A) A thioester derivative of crotonic acid (*trans*-2-butenoic acid) is an intermediate in the synthetic path, but not in the degradative path.  
(B) A thioester derivative of D- $\beta$ -hydroxybutyrate is an intermediate in the synthetic path, but not in the degradative path.  
(C) Fatty acid biosynthesis uses NADPH exclusively, whereas  $\beta$ -oxidation uses  $\text{NAD}^+$  exclusively.  
(D) Fatty acid degradation is catalyzed by cytosolic enzymes, fatty acid synthesis by mitochondrial enzymes.  
(E) The condensation of two moles of acetyl-CoA in the presence of a crude extract is more rapid in bicarbonate buffer than in phosphate buffer at the same pH; the cleavage of acetoacetyl-CoA proceeds equally well in either buffer.
29. Chylomicrons carry \_\_\_ in the \_\_\_\_\_.  
(A) triacylglycerols; cell  
(B) triacylglycerols; blood  
(C) cholesterols; blood  
(D) fatty acids; blood  
(E) fatty acids; cell
30. Which of these statements about the regulation of cholesterol synthesis is *not* true?  
(A) Cholesterol acquired in the diet has essentially no effect on the synthesis of cholesterol in the liver.  
(B) Failure to regulate cholesterol synthesis predisposes humans to atherosclerosis.  
(C) High intracellular cholesterol stimulates formation of cholesterol esters.  
(D) Insulin stimulates HMG-CoA reductase.  
(E) Some metabolite or derivative of cholesterol inhibits HMG-CoA reductase.
31. Which of the following is (are) true of the  $\beta$ -oxidation of long-chain fatty acids?  
1. The enzyme complex that catalyzes the reaction contains biotin.  
2.  $\text{FADH}_2$  serves as an electron carrier.  
3.  $\text{NADH}$  serves as an electron carrier.  
4. Oxidation of an 18-carbon fatty acid produces six molecules of propionyl-CoA.  
5. Oxidation of a 15-carbon fatty acid produces at least one propionyl-CoA.  
(A) 1, 2, and 3  
(B) 1, 2, and 5  
(C) 2, 3, and 4  
(D) 2, 3, and 5

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- (E) 3 and 5 only
32. Which one of the following statements is true?
- (A) The brain prefers glucose as an energy source, but can use ketone bodies.
  - (B) Muscle cannot use fatty acids as an energy source.
  - (C) In a well-fed human, about equal amounts of energy are stored as glycogen and as triacylglycerol.
  - (D) Fatty acids cannot be used as an energy source in humans because humans lack the enzymes of the glyoxylate cycle.
  - (E) Amino acids are a preferable energy source over fatty acids.
33. Free fatty acids in the bloodstream are:
- (A) bound to hemoglobin.
  - (B) carried by the protein serum albumin.
  - (C) freely soluble in the aqueous phase of the blood.
  - (D) nonexistent; the blood does not contain free fatty acids.
  - (E) present at levels that are independent of epinephrine.
34. The Cori cycle is:
- (A) the conversion of lactate to pyruvate in skeletal muscle to drive glycogen synthesis.
  - (B) the interconversion between glycogen and glucose 1-phosphate.
  - (C) the production of lactate from glucose in peripheral tissues with the resynthesis of glucose from lactate in liver.
  - (D) the synthesis of alanine from pyruvate in skeletal muscle and the synthesis of pyruvate from alanine in liver.
  - (E) the synthesis of urea in liver and degradation of urea to carbon dioxide and ammonia by bacteria in the gut.
35. The disaccharide sucrose is composed of:
- (A) glucose and fructose
  - (B) glucose and galactose
  - (C) galactose and maltose
  - (D) all of the above
  - (E) none of the above
36. The steps in glycolysis that are different than those in gluconeogenesis are catalyzed by these enzymes.
- (A) pyruvate kinase, phosphofructokinase, glucokinase
  - (B) pyruvate kinase, glucokinase, hexokinase
  - (C) pyruvate kinase, phosphofructokinase, triose phosphate isomerase
  - (D) pyruvate kinase, phosphofructokinase, hexokinase
  - (E) none of the above
37. Complete the reaction:
- pyruvate + CoASH + NAD<sup>+</sup> →
- (A) acetyl-CoA + NADH + CO<sub>2</sub>
  - (B) phosphoenolpyruvate + NADH + H<sup>+</sup> + CO<sub>2</sub>
  - (C) acetyl-CoA + NADH + H<sup>+</sup> + CO<sub>2</sub>
  - (D) acetyl-CoA + NADH + SH + CO<sub>2</sub>

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- (E) none of the above
38. Which of the following are true statements about the structure of ATP synthase?
- (A) It has a component called  $F_0$  embedded in the inner membrane.
  - (B) It has a component found in the matrix referred to as  $F_1$ .
  - (C) It has a trimer of cytochrome subunits extending into the intermembrane space.
  - (D) a and b
  - (E) a, b and c
39. Which of the following statements about lipoic acid is false?
- (A) It is an antioxidant.
  - (B) It is soluble in aqueous and fatty tissue.
  - (C) It can chelate metal ions.
  - (D) It can neutralize radicals.
  - (E) It is a product of the citric acid cycle.
40. Which of the following statements is false?
- (A) In skeletal muscle glucose is broken down into lactate via glycolysis.
  - (B) In liver lactate is converted to glucose via gluconeogenesis.
  - (C) In skeletal muscle glucose is broken down into lactate via gluconeogenesis.
  - (D) a and b are both false
  - (E) a and c are both false