

國 立 宜 蘭 大 學

112 學年度碩士班考試入學招生

生物化學試題

生物技術與動物科學系生物技術碩士班
及動物科學碩士班（聯合招生）

准考證號碼：

《作答注意事項》

1. 請先檢查准考證號碼、座位號碼及答案卷號碼是否相符。
2. 考試時間：100 分鐘。
3. 本試卷共有選擇題 20 題，一題 5 分，共計 100 分。
4. 請將答案寫在答案卷上。
5. 考試中禁止使用手機或其他通信設備。
6. 考試後，請將試題卷及答案卷一併繳交。
7. 本試卷採雙面影印，請勿漏答。
8. 應試時不得使用電子計算機。

選擇題 (每題 5 分，共 100 分)

- 1. Which of the following methods of transport across a membrane does not require a protein?**
 - (A) Simple diffusion**
 - (B) Facilitated transport**
 - (C) Primary active transport**
 - (D) Secondary active transport**

- 2. What pairs of atoms in bases are involved in hydrogen bonds?**
 - (A) N-H and O-H**
 - (B) N-H and S-H**
 - (C) O-H and P-O**
 - (D) All of the above.**
 - (E) None of the above**

- 3. Which of the following lipids is not found in biological membranes?**
 - (A) triacylglycerols**
 - (B) phosphoacylglycerols**
 - (C) glycolipids**
 - (D) cholesterol**

- 4. Homotropic effects for allosteric enzymes involve**
 - (A) the same molecule binding to different sites in the enzyme**
 - (B) different molecules binding to the same site in an enzyme**
 - (C) different molecules binding to different sites in the same enzyme**
 - (D) All of these are homotropic effects**

- 5. Which of the following four fatty acids has the lowest melting point?**
 - (A) $\text{CH}_3\text{CH}_2\text{CH}_2\text{CH}_2\text{CH}_2\text{COOH}$**
 - (B) $\text{CH}_3\text{CH}_2\text{CH}_2\text{CH}_2\text{CH}_2\text{CH}_2\text{CH}_2\text{COOH}$**
 - (C) $\text{CH}_3\text{CH}_2\text{CH}_2\text{CH}_2\text{CH}_2\text{CH}_2\text{CH}_2\text{CH}_2\text{COOH}$**
 - (D) $\text{CH}_3\text{CH}=\text{CHCH}_2\text{CH}_2\text{COOH}$**

- 6. In DNA sequencing, fragments to be analyzed are produced by**
 - (A) acid hydrolysis**
 - (B) base hydrolysis**
 - (C) selective interruption of DNA synthesis**
 - (D) exposure to ^{32}P**

7. The following enzymes of glycolysis are all involved in regulation of the pathway, except
- (A) Hexokinase
 - (B) Aldolase
 - (C) Phosphofructokinase
 - (D) Pyruvate kinase
8. Which of the following inhibitors binds to the enzyme at a site other than the active site?
- (A) noncompetitive inhibitor
 - (B) competitive inhibitor
 - (C) irreversible inhibitor
 - (D) all of the above
9. Which piece of DNA will have the higher T_m (if both are heated under the same experimental conditions)?
- (A) 30% cytosine plus guanine will have the higher T_m .
 - (B) 50% cytosine plus guanine will have the higher T_m .
 - (C) Their T_m 's will be the same.
 - (D) There's no way to predict for this information
10. Electron flow in the mitochondria follows this pathway:
- (A) Complex I \rightarrow complex II \rightarrow complex III \rightarrow complex IV
 - (B) Complex IV \rightarrow complex III \rightarrow complex II \rightarrow complex I
 - (C) Complex I \rightarrow complex III \rightarrow complex IV
 - (D) Complex II \rightarrow complex III \rightarrow complex IV
 - (E) Both complex I \rightarrow III \rightarrow IV and complex II \rightarrow III \rightarrow IV
11. Which of the following terms describes ATP synthesis in mitochondria?
- (A) substrate-level phosphorylation
 - (B) oxidative phosphorylation
 - (C) photophosphorylation
 - (D) None of them
12. Which of the following modifications is likely to happen to the mRNA in a eukaryotic cell?
- (A) removal of intervening sequences (introns)
 - (B) capping of the 5' end
 - (C) addition of a poly-A tail to the 3' end
 - (D) All of the above occur in eukaryotic cells
 - (E) None of the above occur in eukaryotic cells

13. Which of the following is correct concerning the differences between hemoglobin and myoglobin?
- (A) Both hemoglobin and myoglobin are tetrameric proteins.
 - (B) Hemoglobin exhibits cooperative binding of O₂ while myoglobin does not.
 - (C) Hemoglobin exhibits a hyperbolic O₂ saturation curve while myoglobin exhibits a sigmoid shaped curve.
 - (D) Hemoglobin exhibits a higher degree of O₂ saturation at all physiologically relevant partial pressures of O₂ than does myoglobin.
14. Given the rate law, rate = k[A][B], the overall reaction order is
- (A) zero
 - (B) one
 - (C) two
 - (D) cannot be determined
15. What does amphipathic mean?
- (A) having both positive and negative charges
 - (B) having both acid and base properties
 - (C) having both hydrophilic and hydrophobic regions
 - (D) having two stereoisomers
16. The reactions of glycolysis occur in this eukaryotic cell compartment
- (A) Mitochondrion
 - (B) Nucleus
 - (C) Cytoplasm
 - (D) Both cytoplasm and mitochondria
17. The primer for *in vivo* DNA replication is
- (A) A short piece of RNA
 - (B) A nick made in the DNA template
 - (C) The 3' hydroxyl of the preceding Okazaki fragment
 - (D) A primer is not always required for DNA replication.
18. The linkage between the glucose residues in amylopectin and glycogen is
- (A) For the main chain $\alpha(1\rightarrow4)$ and $\beta(1\rightarrow4)$ for the branches
 - (B) For the main chain $\alpha(1\rightarrow6)$ and $\alpha(1\rightarrow4)$ for the branches
 - (C) For the main chain $\alpha(1\rightarrow4)$ and $\alpha(1\rightarrow6)$ for the branches
 - (D) For the main chain $\beta(1\rightarrow4)$ and $\beta(1\rightarrow6)$ for the branches

19. Which of the following enzymes is not a control point of the citric acid cycle?

- (A) aconitase
- (B) isocitrate dehydrogenase
- (C) citrate synthase
- (D) the α -ketoglutarate dehydrogenase complex

20. Which of the following monosaccharides is a ketose?

- (A) glucose
- (B) galactose
- (C) mannose
- (D) fructose