

科目：生物化學

適用：應化系(生物醫學碩班)

考生注意：

1. 依次序作答，只要標明題號，不必抄題。
2. 答案必須寫在答案卷上，否則不予計分。
3. 限用藍、黑色筆作答；試題須隨卷繳回。

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第 1 頁

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一、單選題 (1-20題，每小題3分，共計60分)

1. Which of the following amino acid are categorized into both ketogenic and glucogenic?
(A) Isoleucine (B) Leucine
(C) Histidine (D) Alanine
2. Which of the following facts about chromosomal DNA are correct?
(A) Mostly A-form (B) Mostly Z-form
(C) Mostly Z-form with minor in B-form (D) Mostly B-form with minor in Z-form
3. If glycine holds a positive charge in a buffer at pH 1, which of the following charges is correct for Gly-Gly-Gly in the same buffer?
(A) +1 (B) +2
(C) +3 (D) None of the above
4. Which of the following amino acid of glycoproteins usually links to carbohydrates?
(A) Valine (B) Aspartic acid
(C) Serine (D) Tyrosine
5. Where can find enzymes for glycolysis in eukaryotes?
(A) Endoplasmic reticulum (B) Mitochondria
(C) Cell membrane (D) Cytosol
6. Which of following statements about pentose phosphate pathway is correct?
(A) The pathway is only in plants, but not in animals.
(B) The pathway produces 6 moles of CO₂ for each mole of glucose consumed.
(C) The pathway provides precursors for the synthesis of nucleotides.
(D) None of the above.
7. The operator region is normally bound by:
(A) Repressor (B) Suppressor tRNA
(C) micorRNA (D) Okazaki fragment
8. Fatty acids that designated as 16:0 and 18:2 ($\Delta 8,11$) are _____ fatty acids, respectively.
(A) Saturated; unsaturated (B) Unsaturated; saturated
(C) Simple; complex (D) Complex; simple
9. Which of the following mutation is most likely caused by sunlight?
(A) Deamination (B) Thymine dimer
(C) Heat-stable DNA polymerase (D) Depurination
10. Which of the following statement is true of DNA replication?
(A) Only one strand of DNA is copied in replication.
(B) Both strands of DNA are copied in replication.
(C) The chain grows from 3' to 5' end in replication.
(D) None of the above.

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11. Where do allosteric inhibitors bind on an enzyme?
 - (A) At the active site
 - (B) At a site different from the active site
 - (C) No specific site
 - (D) None of the above
12. Which of the following statement describes gene silencing by RNA interference (RNAi)?
 - (A) RNAi inhibits transcription
 - (B) RNAi inhibits translation
 - (C) RNAi degrades mRNA
 - (D) RNAi inhibits polyadenylation
13. Which of the following interaction maintain the three-dimensional structures of a protein?
 - (A) Ionic bonds
 - (B) Hydrogen bonds
 - (C) Disulfide linkages
 - (D) All of the above
14. Which of the following is nucleic acid?
 - (A) Corepressor
 - (B) Coactivator
 - (C) Inducer
 - (D) Enhancer
15. Which of the following statement is wrong about small signal molecules that regulate transcription?
 - (A) Small signal molecules cause activator proteins to bind DNA sites.
 - (B) Small signal molecules cause repressor proteins to bind DNA sites.
 - (C) Small signal molecules release repressor proteins from DNA sites.
 - (D) Small signal molecules directly bind to DNA sites.
16. Which of the following statement describes the mechanism of statins that reduce cholesterol levels?
 - (A) Inhibit HMG-CoA reductase
 - (B) Increase HMG-CoA reductase
 - (C) Binding to bile salts
 - (D) Binding to serum cholesterol
17. Which of the following statement about a pentapeptide at its isoelectric pH is correct?
 - (A) The charges are contributed only by the amino and carboxyl termini
 - (B) No charge is contributed by the amino and carboxyl termini
 - (C) The total net charge is zero
 - (D) None of the above
18. Which of the following statement does not describe the function of insulin?
 - (A) Increase glycogen synthesis
 - (B) Decreases glycogen synthesis
 - (C) Enhance glucose transport
 - (D) None of the above
19. Which of the following statement about mitochondrial respiration is correct?
 - (A) The electron carriers are arranged in order of increasing electron affinity.
 - (B) The electron carriers involved in electron transport are present in the cytoplasm of the cell.
 - (C) The final electron acceptor is water.
 - (D) Protons are pumped from the inner mitochondrial membrane to the outer membrane.
20. Which of the following enzymes is essential for ketogenesis?
 - (A) HMG-CoA lyase
 - (B) Acetone carboxylase
 - (C) Acetoacetate decarboxylase
 - (D) catalase

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二、簡答題 (每題10分，共計40分)

21. Please explain (a) the function of RNA interference (RNAi) and (b) its maturation process. (每小題5分，共計10分)
22. Please explain the principle of (a) polymerase chain reaction (PCR) and (b) reverse transcription polymerase chain reaction (RT-PCR). (每小題5分，共計10分)
23. Please rationale how the seed oil turns into cellulose as materials for seed germination. (10分)
24. Please explain the (a) function and (b) the importance of Q cycle of mitochondrial electron transport chain. (每小題5分，共計10分)