

科目：生物化學

適用：應化系

考生注意：

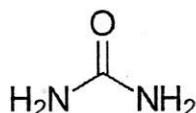
1. 依次序作答，只要標明題號，不必抄題。
2. 答案必須寫在答案卷上，否則不予計分。
3. 限用藍、黑色筆作答；試題須隨卷繳回。

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一、單選題 (1-20題，每小題3分，共計60分)

1. Which of the following cofactor is one of the main products generated by citric acid cycle?
(A) Glucose (B) NADPH
(C) Ribose (D) NADH
2. Which enzyme is required for the oxidation of unsaturated fatty acid?
(A) Enoyl-CoA reductase (B) Enoyl-CoA hydratase
(C) Hexokinase (D) HMG-CoA reductase
3. The structure shown below is _____.



- (A) Urea (B) Uridine
(C) uric acid (D) Carbodiamine
4. Which of the fatty acid holds the higher melting temperature?
(A) 18:2^{Δ9,12} (B) 18:1^{Δ9}
(C) 16:0 (D) 18:0
5. Which of the following monosaccharide is not an aldose?
(A) Glucose (B) Erythrose
(C) Fructose (D) Ribose
6. Which of the following is part of the core promoter?
(A) The Pribnow box (B) The -35 region
(C) The transcription end site (D) None of the above
7. Which of the following is correct for enzyme competitive inhibition?
(A) K_m increased; V_{max} increased (B) K_m increased; V_{max} unaffected
(C) K_m decreased; V_{max} increased (D) K_m decreased; V_{max} unaffected
8. Which of the following statement explains the double stranded structure of transfer RNA (tRNA)?
(A) tRNAs are hydrolyzed in specific places to allow double stranded structure formed.
(B) tRNAs contain self-complimentary stem-loop structures.
(C) tRNAs adopt a structure like Z-DNA allowing double stranded regions to form.
(D) None of the above.
9. The side chain groups of amino acids are bonded to which carbon?
(A) The α -carbon (B) The β -carbon
(C) The carbonyl carbon (D) None of the above
10. The amino acids which occur in proteins?
(A) Are all of the L- form (B) Do not have L- and D- forms
(C) Are all of the D- form (D) Can be either the L- or D- form

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11. What do amino acids such as alanine, leucine, isoleucine, tryptophan, and valine have in common?
 - (A) They all are polar-neutral amino acids.
 - (B) They all are nonpolar amino acids.
 - (C) They all are acidic amino acids.
 - (D) They all are basic amino acids.
12. Which of the following describes the method for separation molecules according to the ratio of charge to size?
 - (A) Electroporation
 - (B) Electroplating
 - (C) Electrolysis
 - (D) Electrophoresis
13. Which of the following can be used to visualize the DNA bands located on an electrophoresis gel?
 - (A) Dyes which bind to DNA
 - (B) Fluorescence
 - (C) Luminescence
 - (D) All of the above
14. Which of the following is a feature of qPCR that is different from the original PCR?
 - (A) qPCR allows the reaction to proceed until the primers are exhausted.
 - (B) qPCR requires the use of primers.
 - (C) qPCR can estimate the original templates.
 - (D) qPCR requires DNA polymerase.
15. Which of the following description about the pH of the mitochondrial matrix and intermembrane space is correct?
 - (A) The pH of matrix is higher than the pH in intermembrane space.
 - (B) The pH of matrix is higher than the pH in intermembrane space.
 - (C) The pH of matrix is equal to the pH in intermembrane space.
 - (D) None of the above.
16. The ultimate electron acceptor in the electron transport chain is?
 - (A) FAD
 - (B) NAD⁺
 - (C) ADP
 - (D) Oxygen
17. Which of the following enzyme is involved in both fatty acid synthesis and breakdown?
 - (A) Transferase
 - (B) Synthase
 - (C) Carboxylase
 - (D) All of the above
18. Which of the following term is the full name of ACP used in fatty acid synthesis?
 - (A) Acetyl-CoA phosphate
 - (B) Acyl Carnitine Protein
 - (C) Acyl Carrier Protein
 - (D) Adenosine cyclophosphate
19. How many ATPs per glucose molecule is produced under aerobic respiration (glucose → CO₂ + H₂O)?
 - (A) 15
 - (B) 30 - 32, dependent on the shuttle system used
 - (C) 20
 - (D) 40
20. Which of the following statement is correct about the sigma (σ) subunit of RNA polymerase released from the core enzyme?
 - (A) The subunit is released before transcription begins.
 - (B) The subunit is released after transcription begins.
 - (C) The subunit is released just prior to chain termination.
 - (D) None of the above.

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二、簡答題 (每題10分，共計40分)

21. Please explain (a) the glycolysis and (b) gluconeogenesis. (每小題5分，共計10分)
22. Please explain the role of 6-phosphofructo-2-kinase (PFK-2)/fructose 1,6-bisphosphatase (FBPase)-2 in the regulation of glycolytic and gluconeogenic processes. (10分)
23. Please explain (a) β -oxidation using palmitic acid as example and (b) calculate the number of acetyl-CoA produced. (每小題5分，共計10分)
24. Please explain the mechanism of pyruvate dehydrogenase complex for acyl-CoA generation. (10分)

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