

編號： 69 系所：生命科學系甲組

科目：生物化學

本試題是否可以使用計算機：可使用，不可使用（請命題老師勾選）**I. Multiple choice questions (38%)**

1. The peptide bond
 - A). is formed by elimination of water between two amino acid residues
 - B). has partial double bond character
 - C). is the basic of protein structure
 - D). all of the above

2. The advantage of using a Lineweaver-Burk plot to analyze enzyme kinetics is that
 - A). it is easier to work with a straight line than with a curve
 - B). less computation is required
 - C). it can be plotted by computer
 - D). all plotted lines go through the origin

3. The concerted and sequential models for the behavior of allosteric enzymes differ in
 - A). the conformational change in the enzyme in one model and not in the other
 - B). the number of predicted binding sites on the enzyme
 - C). the manner in which changes in quaternary structure take place
 - D). the response of the enzyme to changes in temperature

4. Substrate-level phosphorylation refers to a reaction in which
 - A). the phosphate group is not bound to the enzyme in the course of the reaction
 - B). the source of the phosphate group is not ATP but phosphate ion
 - C). the substrate is not bound to the enzyme but the phosphate group is covalently bonded to a serine in the active site of the enzyme
 - D). fructose 1,6-bisphosphate is the source of the phosphate group

5. The citric acid cycle is considered part of aerobic metabolism even though oxygen does not appear explicitly in any reaction because
 - A). the NADH and FADH₂ produced are reoxidized in the electron transport chain linked to oxygen
 - B). the reoxidation of NADH and FADH₂ leads to the production of consideration quantities of ATP
 - C). it takes place in the mitochondrion
 - D). it contains oxidation reactions

6. An important difference between respiratory inhibitors and uncouplers is that
 - A). uncouplers do not inhibit electron transport while respiratory inhibitors do so
 - B). uncouplers are toxic substances while respiratory inhibitors are not
 - C). the effect of respiratory inhibitors cannot be characterized spectroscopically while that of uncouplers can
 - D). none of the above

7. In gluconeogenesis, which of the following is an intermediate in the production of phosphoenolpyruvate (PEP) from pyruvate
 - A). oxaloacetate
 - B). acetyl-CoA
 - C). glyceraldehydes 3-phosphate
 - D). 1,3-bisphosphoglycerate

(背面仍有題目,請繼續作答)

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8. Singer and Nicolson's fluid mosaic model of membrane structure presumed all of the following statements to be true EXCEPT:
- A). Proteins can be anchored to the membrane by covalently linked lipid chains
 - B). Proteins can move laterally across a membrane
 - C). Membranes should be about 5 nm thick
 - D). Transverse motion of lipid molecules can occur occasionally
9. Which of the following peptides would be the most likely to acquire a prenyl anchor?
- A). RIGHTCALL
 - B). PICKME
 - C). ICANTICANT
 - D). AINTMEPICKA
10. In his transformation experiments, Griffith observed that
- A) infecting mice with nonpathogenic strains of bacteria makes them resistant to pathogenic strains.
 - B) mixing a heat-killed pathogenic strain of bacteria with a living nonpathogenic strain can convert some of the living cells into the pathogenic form.
 - C) mixing a heat-killed nonpathogenic strain of bacteria with a living pathogenic strain makes the pathogenic strain nonpathogenic.
 - D) mutant mice were resistant to bacterial infections.
 - E) mice infected with a pathogenic strain of bacteria can spread the infection to other mice.
11. When T2 phages infect bacteria and make more viruses in the presence of radioactive sulfur, what is the result?
- A) The bacterial DNA will be radioactive.
 - B) The viral proteins will be radioactive.
 - C) The viral DNA will be radioactive.
 - D) both A and B
 - E) both A and C
12. What kind of molecule or substance is the primer that is used to initiate the synthesis of a new DNA strand?
- A) DNA
 - B) RNA
 - C) protein
 - D) phosphate
 - E) sulfur
13. What is the function of topoisomerase?
- A) unwinding of the double helix
 - B) relieving strain in the DNA ahead of the replication fork
 - C) elongation of new DNA at a replication fork by addition of nucleotides to the existing chain
 - D) the addition of methyl groups to bases of DNA
 - E) stabilizing single-stranded DNA at the replication fork

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14. Which of the following help to hold the DNA strands apart while they are being replicated?
- A) ligase
 - B) single-strand binding proteins
 - C) primase
 - D) exonuclease
 - E) DNA polymerase
15. Which of the following are nitrogenous bases of the purine type?
- A) adenine and thymine
 - B) guanine and adenine
 - C) thymine and uracil
 - D) cytosine and guanine
 - E) uracil and cytosine
16. The difference between the sugar in DNA and the sugar in RNA is that the sugar in DNA
- A) can attach to a phosphate.
 - B) contains one less oxygen atom.
 - C) is a six-carbon sugar and the sugar in RNA is a five-carbon sugar.
 - D) can form a double-stranded molecule.
 - E) has a six-membered ring of carbon and nitrogen atoms.
17. Which of the following is true for both prokaryotic and eukaryotic gene expression?
- A). The mRNA transcript is the exact complement of the gene from which it was copied.
 - B). mRNA is synthesized in the 3' to 5' direction.
 - C). After transcription, a 3' poly-A tail and a 5' cap are added to mRNA.
 - D). RNA polymerase binds to the promoter region to begin transcription.
 - E). Translation of mRNA can begin before transcription is complete.
18. RNA polymerase and DNA polymerase differ in that _____
- A). RNA polymerase is much more accurate than DNA polymerase.
 - B). RNA polymerase uses RNA as a template, and DNA polymerase uses a DNA template.
 - C). RNA polymerase does not need to separate the two strands of DNA in order to synthesize an RNA copy, whereas DNA polymerase must unwind the double helix before it can replicate the DNA.
 - D). RNA polymerase binds to single-stranded DNA, and DNA polymerase binds to double-stranded DNA.
 - E). RNA polymerase can initiate RNA synthesis, but DNA polymerase requires a primer to initiate DNA synthesis.
19. Which of the following is not related to ribosomal activity?
- A). A site
 - B). P site
 - C). codon recognition
 - D). spliceosome
 - E). peptide bond formation

(背面仍有題目,請繼續作答)

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1. What is the difference between the hydrolytic and phosphorolytic cleavages of glucose polymers and describe their different physiological functions in mammals. (6%)
2. Describe the main difference between the equilibrium assumption and steady assumption for the enzyme kinetic study. (5%)
3. Choose the correct answer from the list below. Not all of the answers will be used (10%).

(A). HGPRT	(B). Adenosine deaminase	(C). Homocysteine
(D). S-adenosylmethionine	(E). Phenylalanine metabolism	
(F). α -oxidation	(G). β -oxidation	

	Refsum's disease
	Heart attacks
	Lesch-Nyhan syndrome
	Severe combined immunodeficiency syndrome
	Alkaptonuria
4. Describe the glucose-alanine cycle and its significance in amino acid metabolism (6%)
5. What properties of hyaluronate, chondroitin sulfate, and keratin sulfate make them ideal components of cartilage? (5%)
6. A typical gene utilizes a segment of DNA whose molecular weight is 10^6 . How many turns of the helix does this represent? (5%)
7. Distinguish a missense and a nonsense mutation. (6%)
8. Eukaryotic organisms have a large number of copies (usually more than one hundred) of the genes that code for ribosomal RNA, yet they have only two copies (one on each of two homologs) of genes that code for a ribosomal protein. Explain how eukaryotes can produce the same number of ribosomal RNAs and ribosomal proteins, given this disparity in gene copy number. (6%)
9. In prokaryotes, Shine-Dalgarno sequences refer to special sequences that pair with the 3' end of an rRNA. What is the function of these sequences? (5%)
10. What is posttranslational modification? Why is it important for protein function? (8%)