

臺北醫學大學 101 學年度碩士班暨碩士在職專班招生入學考試

基礎生物化學試題

本試題第 1 頁；共 3 頁

(如有缺頁或毀損，應立即請監試人員補發)

注
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項

- 一、本試題共二大題，共計 100 分。
- 二、請將最適當的答案依題號作答於答案用卷本上。
- 三、試題答錯者不倒扣；題次號碼錯誤或不按順序或鉛筆作答，不予計分。

一、選擇題：(50%)

- Which of the following molecule is amphipathic?
(A) sodium chloride (B) acetic acid (C) palmitic acid (D) benzene
- Determination of the sequence of amino acids in a peptide is done by
(A) X-ray crystallography (B) trypsin hydrolysis
(C) treatment with cyanogen bromide (D) Edman degradation
- Redox reactions often use this cofactor:
(A) riboflavin (B) lipoic acid (C) pyridoxal (D) thiamine
- Sphingolipids are particularly important in these structures:
(A) membranes (B) lipoproteins
(C) membranes, the brain and the nervous system (D) the brain and nervous system
- The vitamin needed for blood coagulation is
(A) vitamin A (B) vitamin K (C) vitamin D (D) vitamin E
- Which of the following codons does not code for an amino acid?
(A) AUG (B) CAU (C) UAA (D) GUU
- A proteome is
(A) a protein-based vector
(B) a three-dimensional protein structure
(C) a collection of all the proteins produced in a given cell or tissue
(D) an improperly digested protein responsible for certain diseases such as "mad cow" disease
- The usefulness of blotting techniques in molecular biology is that
(A) spills of hazardous chemicals are minimized
(B) only the substance of interest is transferred to a nitrocellulose disk
(C) it directly gives rise to a genetic map
(D) transferred material is in the same relative position on the disk as on the original sample
- Proteins which inhibit transcription of genes that would cause increased replication are called
(A) oncogenes (B) cytokines (C) tumor suppressors (D) interleukins
- An epitope is
(A) a disease-causing organism
(B) a binding site for an antigen on an antibody
(C) a class of plasma cell
(D) a protein secreted by T cells to activate the growth of other cells
- The main difference, on the surface of a red blood cell, between the A-B-O major blood groups depends on
(A) the presence or absence of a certain protein sequence (B) the presence or absence of a certain sugar
(C) the presence or absence of an acetyl group on a sugar (D) all of these

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12. Chitin, which forms the exoskeletons of insects, is composed of
- (A) $\alpha(1-4)$ linked N-acetylglucosamine residues (B) $\beta(1-4)$ linked N-acetylglucosamine residues
(C) $\alpha(1-4)$ linked glucose residues (D) $\beta(1-4)$ linked glucose residues
13. A bacterial cell wall is composed of:
- (A) a polysaccharide consisting of a single type of monosaccharide unit and cross-linking oligopeptides
(B) a polysaccharide consisting of 2 types of monosaccharide units and cross-linking oligopeptides
(C) a polysaccharide consisting of 3 types of monosaccharide units and cross-linking oligopeptides
(D) two different polysaccharides and 1 type of oligopeptide, which are cross-linked
14. Cellulose is indigestible to most animals because
- (A) animals do not have the enzymes needed to hydrolyze ester linkages between the monomer units
(B) animals do not have the enzymes needed to hydrolyze the α -glycosidic linkages between the monomer units
(C) animals do not have the enzymes needed to hydrolyze the β -glycosidic linkages between the monomer units
(D) its molecular weight is too high for it to be degraded by enzymes
15. Which of the following enzymes relies on thiamine pyrophosphate as a cofactor?
- (A) pyruvate kinase (B) pyruvate decarboxylase (C) lactate dehydrogenase (D) enolase
16. An enzyme not involved in the control of glycolysis is
- (A) hexokinase (B) triose phosphate isomerase
(C) pyruvate kinase (D) phosphofructokinase
17. Which of the following molecules is not a product of the pentose phosphate pathway?
- (A) NADPH (B) ribose-5-phosphate (C) glyceralate-3-phosphate (D) xylulose-5-phosphate
18. Which enzymes in the citric acid cycle catalyze oxidative decarboxylation reactions?
- (A) isocitrate dehydrogenase and the α -ketoglutarate dehydrogenase complex
(B) aconitase and succinate dehydrogenase
(C) the α -ketoglutarate dehydrogenase complex and succinate thiokinase
(D) fumarase and succinate dehydrogenase
19. Which of the following is true concerning mitochondrial DNA?
- (A) Alzheimer's disease is the only known disease related to mt DNA
(B) DNA in mitochondria must be transcribed and translated outside of the mitochondria since mitochondria have no protein synthesis capability
(C) mitochondria have their own DNA
(D) all of these are true
20. Where in the cell does β -oxidation occur?
- (A) cytoplasm (B) outer mitochondrial membrane
(C) nucleus (D) mitochondrial matrix
21. A key intermediate in the catabolism of fatty acids with uneven numbers of carbon atoms is
- (A) propionyl-CoA (B) malonyl-CoA (C) oxaloacetate (D) phosphoenolpyruvate
22. Purine salvage reactions
- (A) produce nucleosides as products (B) use nucleosides as the substrate
(C) use bases as the substrate (D) require the hydrolysis of ATP
23. Which of the following are all essential amino acids in humans?
- (A) leucine, lysine, valine (B) methionine, threonine, serine
(C) arginine, histidine, cysteine (D) glutamate, glutamine, arginine

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24. A coenzyme frequently encountered in transamination reactions is
Ⓐ tetrahydrofolate Ⓑ pyridoxal phosphate Ⓒ thiamine pyrophosphate Ⓓ biotin
25. When cyclic AMP is a second messenger
Ⓐ cyclic AMP inhibits a protein kinase
Ⓑ the binding of hormone produces the desired effect in the cell by stimulating the production of cyclic AMP
Ⓒ the G protein plays no role
Ⓓ a target enzyme is phosphorylated with cyclic AMP as the source of the phosphate group

二、問答題：(50%)

- 請簡述化學鍵(Chemical bonds)的種類並舉例說明？(10%)
- 求下列化合物中各元素的重量百分比(重量比 X 100%)？
 - C_2H_6O (5%)
 - $C_2H_4ON_2$ (5%)
- 假設以甘胺酸，胺基丙酸及絲胺酸為單位來合成三胜肽。
 - 用任三種胺基酸於任三個位置，且可重覆使用，則可合成幾種不同的三胜肽？(5%)
 - 如果每種胺基酸只可使用一次而不能重覆使用，則可合成幾種不同的三胜肽？(5%)
- 由 5'-AGCTTGCAACGTTGCATTAG-3' 這段 DNA 作為複製的模板，
 - 試寫出複製時的 DNA 順序。(5%)
 - 寫出由(1)新複製的 DNA 股，轉錄時的 RNA 順序。(5%)
- 請簡述 Polymerase Chain Reaction (PCR) 的基本原理？(10%)