

大葉大學九十二學年度碩士班甄試試題紙

所 別	組別	考 試 科 目 (中 文 名 稱)	考 試 日 期	考 試 時 間	備 註
分子生物科技所	甲	生物化學	12月9日	9:00—10:30	P2-1

註：備註欄若未註明可攜帶計算機或其他資料作答時，考生一律不准攜帶。

一、Multiple Choice (2 points each , 40 points total) :

1. The structure of a nucleotide can include all of the following
(A) purine (B) pyrrole (C) sugar (D) phosphoric acid .
2. Functional proteins
(A) consist of a single polypeptide chain. (B) consist entirely of amino acids linked by amide bonds. (C) consist of helical regions linked by other regions of unknown geometry (D) exert their biological effects by binding other molecules.
3. Glycosylation
(A) is a covalent addition of fatty acids to proteins. (B) is a frequent characteristic of cytosolic proteins. (C) is the covalent addition of carbohydrate groups to proteins. (D) occurs in the mitochondria.
4. A signal patch
(A) is a conformation-dependent site on a protein that is responsible for targeting it to specific cellular compartments. (B) is a grouping of receptors on the surface of a cell. (C) is the site where a signaling molecule such as a hormone binds to the receptor. (D) is a single linear amino acid sequence in a protein that is responsible for targeting it to specific cellular compartments. (E) has properties affected by the presence and number of double bonds in acyl groups.
5. Which of the following statements about a Lineweaver-Burk plot (for a nonallosteric enzyme) is true?
(A) The plot takes the form of a straight line. (B) It is difficult to determine the maximum velocity of a reaction by means of a Lineweaver-Burk plot. (C) A Lineweaver-Burk plot is a plot of $1/V_0$ versus $1/[S]$. (D) You can convert the Lineweaver-Burk equation to the Michaelis-Menten equation by taking the reciprocals of both sides of the equation.
6. A conformational change as a result of substrate binding at an active site is characteristic of
(A) the sequential model of allostery. (B) allostery. (C) low substrate concentration. (D) enzymes with a single subunit.
7. Which of the following is an example of cooperative behavior?
(A) reversible binding of a ligand. (B) the order-disorder transition in DNA. (C) the binding of oxygen to hemoglobin. (D) the binding of oxygen to myoglobin.
8. Which interactions usually play a role in protein folding?
(A) Hydrophobic interactions. (B) Backbone hydrogen bonds. (C) Dehydration reactions. (D) Metal-ion bonding.
9. G-protein-linked receptors are transmembrane proteins that
(A) form dimmers upon activation. (B) induce, after stimulation, the associated trimeric G protein to exchange its GTP for GDP. (C) directly activate adenylate cyclase. (D) are stimulated by extracellular factors such as peptide hormones and neurotransmitters.
10. Calmodulin is an intracellular protein
(A) that binds to DNA sequences via their negatively charged phosphate groups. (B) has EF hands structural motifs (C) formed of four identical subunits. (D) that changes shape after interaction with calcium.
11. About how many ATPs are produced from glucose to CO_2 and H_2O ?
(A) 20-22 (B) 25-27 (C) 30-32 (D) 40-42 (E) 40-42.
12. In a cycle of Kreb's (or TCA or citric acid) cycle, $CH_3CO-S-CoA + a NAD^+ + b FAD^+ + c GTP + H_2O \longleftrightarrow 2 CO_2 + 2 HS-CoA + a NADH + b FADH_2 + c GTP$
(A) $a=1, b=2, c=3$ (B) $a=3, b=2, c=1$ (C) $a=3, b=1, c=1$ (D) $a=3, b=1, c=2$ (E) $a=2, b=1, c=3$.
13. Please indicate pathways involve with fatty acid oxidation.
(A) α oxidation (B) β oxidation (C) γ oxidation (D) θ oxidation (E) ω oxidation.
14. Products of the Glyoxylate cycle are:
(A) fumarate (B) succinate (C) glyoxylate (D) NADH (E) NADPH.
15. Which are ketone bodies in human beings:
(A) acetone (B) acetoacetate (C) β -hydroxybutyrate (D) glutamate (E) glycerol.

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分子生物科技所	甲	生物化學	12月9日	9:00—10:30	P2-2

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- In animals' metabolism, three forms of nitrogen are excreted
(A) asparagine (B) urea (C) N_2 (D) uric acid (E) ammonia.
- Which molecules connect urea and citric acid cycle
(A) ornithine (B) fumarate (C) acetyl Co-A (D) sucrose (E) cytochrome C.
- In the following terms, which are related with photosynthesis:
(A) RuBP carboxylase (B) fructose bisphosphatase (C) aspartate-argininosuccinate shunt (D) Calvin cycle (E) IAA
- Among those enzymes different between glycolysis and gluconeogenesis, they are
(A) phosphoenolpyruvate carboxykinase (B) pyruvate carboxylase (C) malate dehydrogenase (D) fructose-1,6-bisphosphatase (E) glucose-6-phosphatase.
- In living system, one carbon transfer requires
(A) S-adenosylmethionine (B) tetrahydrofolate (C) pyridoxal phosphate (D) Gal-UDP (E) lipoate.

二、Describe the following (3 points each, 30 points total):

- Active transport
- Apoprotein
- Gene
- Competitive inhibition
- Suicide inhibitor
- Facilitated diffusion
- ATP structure
- Prochiral molecule
- The purposes of pentose phosphate pathway
- Give one example of saturated and unsaturated fatty acid (name and structure), respectively.

三、Name the groups of the amino acids which are classified based on the polarity of the R group. Also give an example of each group. (6 points)

四、Describe DNA sequencing by the Sanger method and capillary electrophoresis. (6 points)

五、Describe the yield of ATP during oxidation of one molecule of palmitoyl-CoA. (6 points)

六、Describe the three stages of CO_2 assimilation in photosynthetic organisms. (6 points)

七、Draw the Lineweaver-Burk plots showing three modes of reversible enzyme inhibition. (6 points)