

國立中央大學 110 學年度碩士班考試入學試題

所別： 生命科學系 碩士班 植物暨微生物環境生物學組(一般生)

共3頁 第1頁

科目： 生物化學 I.(含代謝)

本科考試禁用計算器

*請在答案卷(卡)內作答

一、單選題 (請選擇一個最適合的答案；每題 3 分；共計 36 分)

1. Which of the following enzymes that converts atmospheric N into the biological usable form?
 - (A) amino acid oxidase
 - (B) amino transferase
 - (C) glutamine synthetase
 - (D) glutamate synthase
 - (E) nitrogenase
2. Lactose is formed
 - (A) by a reaction catalyzed by lactase.
 - (B) when water molecules are added to two monosaccharides.
 - (C) when ionic bonds link two monosaccharides.
 - (D) by a $\beta 1 \rightarrow 4$ linkage between a galactose and a glucose molecule.
 - (E) when glucose and fructose are combined.
3. Which of the following best describes the general structure of a cell membrane?
 - (A) a layer of protein coating a layer of phospholipid
 - (B) protein embedded in two layers of phospholipid
 - (C) phospholipid embedded in two layers of protein
 - (D) protein sandwiched between two layers of phospholipid
 - (E) any of the above
4. Which of the following statements for proteins is *correct*?
 - (i) The four levels of structure of a protein are determined by its primary sequence.
 - (ii) Secondary structure includes mainly α helix and β sheet.
 - (iii) Collagen has four levels of structure.(A) i (B) i, ii (C) ii, iii (D) i, iii (E) i, ii, iii
5. Which one of the following is **not** a characteristic of the chloroplast ATP synthase?
 - (A) It is a protein complex
 - (B) It requires the input of NADPH
 - (C) It transports H^+ from the thylakoid compartment to the stroma
 - (D) It couples the flow of H^+ to the phosphorylation of ADP
 - (E) All are correct.

注意:背面有試題

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6. The first high-energy product formed in glycolysis is
- (A) 3-phosphoglycerate
 - (B) 1,3-bisphosphoglycerate
 - (C) Dihydroxyacetone 3-phosphate
 - (D) Glyceraldehydes 3-phosphate
 - (E) Phosphoenolpyruvate
7. Which of the following TCA cycle enzymes catalyzes a substrate level phosphorylation
- (A) Isocitrate dehydrogenase
 - (B) α -Ketoglutarate dehydrogenase
 - (C) Isocitrate dehydrogenase
 - (D) Succinate dehydrogenase
 - (E) Succinyl-CoA synthetase
8. Complete β -oxidation of palmitoyl CoA can theoretically produce how many molecules of ATP?
- (A) 88
 - (B) 96
 - (C) 117
 - (D) 131
 - (E) 140
9. What kind of the interaction occurs mainly between histones and DNA?
- (A) Covalent
 - (B) Hydrogen bonding
 - (C) Hydrophobic
 - (D) Hydrophilic
 - (E) Ionic
10. Rubisco catalyzes the carboxylation and oxygenation of ribulose 1,5-bisphosphate (RuBP). The first products of these reactions are?
- (A) 2-phosphoglycolate
 - (B) Glyceraldehyde 3-phosphate
 - (C) 2-phosphoglycolate & 3-phosphoglycerate
 - (D) Glyceraldehyde 3-phosphate & 3-phosphoglycolate
 - (E) Glyceraldehyde 3-phosphate & 2-phosphoglycolate

注意:背面有試題

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11. The migration of a protein on a SDS polyacrylamide gel is best described as inversely proportional to
- (A) protein complex size
 - (B) positive charge
 - (C) negative charge
 - (D) log of molecular weight
 - (E) log of isoelectric point
12. What is the definition of T_m (melting temperature) of DNA?
- (A) The temperature at which DNA molecules start to denature
 - (B) The temperature at which all DNA molecules are denatured
 - (C) The temperature at which half of DNA molecules are denatured
 - (D) The temperature at which all GC bases are denatured
 - (E) The temperature at which half of GC bases are denatured

二、簡答題 (每題 6 分；共計 54 分)

1. Cristae and Thylakoid
2. Antenna complex & Photosystem
3. Saturated fatty acid & Unsaturated fatty acid
4. Polymerase and Reverse transcriptase
5. Photosynthetic phosphorylation and Oxidative phosphorylation
6. Heat shock proteins & Chaperones
7. C3 plants and C4 plants
8. Fructose-2,6-bisphosphate & Phosphofructokinase
9. Operon and *trp* operon

三、問答題 (10 分)

1. What is the mechanism and application for polymerase chain reaction?