

國立成功大學

114學年度碩士班招生考試試題

編 號： 220

系 所： 口腔醫學研究所

科 目： 生物化學

日 期： 0211

節 次： 第 3 節

注 意： 1.不可使用計算機
2.請於答案卷(卡)作答，於
試題上作答，不予計分。

一、 選擇題 (每題 5 分)

1. Which of the following is not required for protein synthesis?
 - (A) mRNA
 - (B) Ribosomes
 - (C) GTP
 - (D) All the various tRNAs and their attached electrodes
 - (E) None of the above

2. Insulin is a protein composed of two peptide chains connected by a disulfide bond. Which amino acid side chain can form this covalent bond?
 - (A) cystine
 - (B) cysteine
 - (C) isoleucine
 - (D) proline
 - (E) None of the above

3. Which of the following statements is correct regarding starch, glycogen, cellulose, and chitin?
 - (A) All have $\alpha 1 \rightarrow 4$ links.
 - (B) Chitin is made up of different monomers.
 - (C) Only glycogen has a core protein.
 - (D) Each is made of one type of monomer.
 - (E) Chitin and cellulose differ only in their degree of branching.

4. Which residues in proteins are common sites of phosphorylation?
 - (A) Serine, Histidine, Tyrosine
 - (B) Serine, Alanine, Tyrosine
 - (C) Serine, Threonine, Tyrosine
 - (D) Serine, Tyrosine, Aspartate
 - (E) All of the above

5. Which residues in proteins are common sites of glycosylation?
 - (A) Asparagine
 - (B) Aspartate
 - (C) Glutamine
 - (D) Glutamate
 - (E) None of the above

6. Which of the following tetrapeptides is the most difficult to soluble in water?
 - (A) Alanine-glycine-lysine-phenylalanine
 - (B) Phenylalanine-leucine-alanine-isoleucine
 - (C) Leucine-alanine-lysine-serine
 - (D) Glutamate-aspartate-glycine-arginine
 - (E) Lysine-proline-arginine-glycine

7. Which of the following proteins moves toward the anode the fastest during electrophoresis at a pH of 7.0?
- (A) protein A (molecular weight 25kDa, isoelectric point 7.0)
 - (B) protein B (molecular weight 200kDa, isoelectric point 4.5)
 - (C) protein C (molecular weight 25kDa, isoelectric point 4.5)
 - (D) protein D (molecular weight 25kDa, isoelectric point 9.5)
 - (E) protein E (molecular weight 200kDa, isoelectric point 9.5)
8. Which of the following is not related to eukaryotic cell transcription?
- (A) DNA template
 - (B) DNA polymerase
 - (C) RNA polymerase
 - (D) promoter
 - (E) None of the above
9. The RAS-MAPK signaling pathway can regulate both cell death and survival signals. Which of the following molecules is required for activation of RAS?
- (A) GTP
 - (B) ATP
 - (C) NADH
 - (D) Ca^{2+}
 - (E) None of the above
10. The temperature at which a lipid bilayer shifts from a fluid state to a crystalline gel is called ____.
- (A) transition temperature
 - (B) optimum temperature
 - (C) gelation temperature
 - (D) crystal temperature
 - (E) None of the above
11. The GAL4 protein activates transcription from the GAL1 promoter in yeast. To bind to DNA, the protein utilizes a
- (A) signal peptide
 - (B) transcriptional-activating domain
 - (C) zinc-finger domain
 - (D) transmembrane segment
 - (E) heme group
12. Which of the following events occurs first as a result of EGF binding to its receptor?
- (A) Activation of a GTPase
 - (B) Activation of a phospholipase
 - (C) Activation of a tyrosine phosphatase
 - (D) Activation of a tyrosine kinase
 - (E) None of the above

二、 簡答題

1. What is epigenetic regulation? Discuss how environmental factors may affect epigenetic regulation in humans. (20%)
2. Two polypeptides, A and B, have similar tertiary structures, but A normally exists as a monomer, whereas B exists as a tetramer. What differences might be expected in the amino acid composition of A versus B? (10%)
3. COVID-19 vaccines help our bodies develop immunity to the virus. Please describe how mRNA COVID-19 vaccines work (10%)