

國立中央大學103學年度碩士班考試入學試題卷

所別：生命科學系碩士班 分子與細胞生物組(一般生) 科目：生物化學 共 2 頁 第 1 頁
生命科學系碩士班 分子與細胞生物組(在職生)

本科考試禁用計算器

*請在試卷答案卷(卡)內作答

一. 單選題(每題2分; 共76分)

1. Which of the following amino acids is included in the catalytic triad of a serine protease? (a) His (b) Ser (c) Asp (d) All of the above (e) None of the above.
2. Which description about Hb (hemoglobin) is incorrect? (a) HbA has an $\alpha_2\beta_2$ structure (b) HbF has an $\alpha_2\gamma_2$ structure (c) HbA has a higher affinity for BPG than does HbF (d) CO_2 reduces the binding affinity of HbA for O_2 (e) A HbA molecule can carry at most 1 O_2 molecule.
3. Which of the followings is NOT the major lipid component of biological membranes? (a) glycerophospholipids (b) sphingolipids (c) glycosphingolipids (d) cholesterol (e) glycolipids
4. How many moles of net ATP can be produced from anaerobic glycolysis of 1 mole of glucose? (a) 0 (b) 1 (c) 2 (d) 3 (e) 4.
5. The concentration of a protein solution can be determined by its absorption at ___ nm. (a) 260 (b) 280 (c) 400 (d) 666 (e) 800.
6. Which of the following compounds has the highest molecular weight? (a) adenine (b) adenosine (c) guanine (d) uracil (e) guanylate.
7. Which of the following restriction endonucleases has a cohesive end compatible with that of XhoI (CTCGAG) after cleavage? (a) EcoRI (GAATTC) (b) BamHI (GGATCC) (c) Sall (GTCGAC) (d) HindIII (AAGCTT) (e) XbaI (TCTAGA).
8. Which of the following scientists made a significant contribution to the understanding of prion? (a) S. B. Prusiner (b) J. D. Watson and H. C. Crick (c) K. B. Mullis (d) A. D. Hershey and M. Chase (e) R. Franklin.
9. Which of the following amino acids has an imidazole side chain? (a) Gly (b) Trp (c) Tyr (d) Lys (e) His.
10. Lactose is a disaccharide linked by a ___ linkage. (a) $\alpha(1\rightarrow4)$ (b) $\beta(1\rightarrow4)$ (c) $\alpha(1\rightarrow2)$ (d) $\beta(1\rightarrow2)$ (e) $\beta(2\rightarrow4)$.
11. Fatty acids of plants and algae can be converted to "biodiesel" by ___ with alcohol. (a) glycosylation (b) phosphorylation (c) hydrogenation (d) esterification (e) ADP-ribosylation.
12. How many different codons are used to decode tryptophan? (a) 0 (b) 1 (c) 2 (d) 3 (e) 4.
13. An amphiphilic α helix will have side chains of similar polarity every ___ residues. (a) 0-1 (b) 1-2 (c) 2-3 (d) 3-4 (e) 4-5
14. Tamiflu, a structural analogue of ___, is a strong inhibitor of neuraminidase. (a) sialic acid (b) hemagglutinin (c) lactose (d) sucrose (e) cholesterol
15. Cellulose is a polymer of ___. (a) glucose (b) α -D-glucosamine (c) β -D-glucosamine (d) N-acetyl- β -D-glucosamine (e) N-acetyl- β -D-galactosamine
16. The sweetness of honey mainly comes from ___. (a) sucrose (b) glucose (c) fructose (d) lactose (e) maltose
17. Translation of mRNA into protein sequence begins with an AUG codon, which encodes ___ in prokaryotes? (a) fMet (b) Met (c) Trp (d) Gly (e) Tyr.
18. Which of the following enzymes of ammonia incorporation is the most highly regulated? (a) glutamate dehydrogenase (b) glutamate synthetase (c) glutamine synthetase (d) glutamine synthase (e) none of the above
19. Membrane potential and the proton gradient (a) are both required to make ATP (b) are sufficient separately, to make ATP from ADP + Pi (c) reinforce one another when respiratory inhibitors are present (d) cancel one another when uncouplers are present (e) None
20. Transamination is the transfer of an amino (a) acid to carboxylic acid plus ammonia (b) group from an amino acid to a keto acid (c) acid to a keto acid plus ammonia (d) group from an amino acid to a carboxylic acid (e) None.
21. Which of the following is formed by oxidation of a DNA base? (a) uracil (b) 8-oxoguanine (c) 7-methylguanine (d) thymine dimer (e) all of the above
22. Which of the following regulates glycolysis steps? (a) phosphofructokinase (b) hexose kinase (c) pyruvate kinase (d) All of the above (e) None.
23. Vitamine B₁₂ is useful in the prevention and treatment of (a) pernicious anemia (b) scurvy (c) cataract (d) beri-beri (e) none.

注意：背面有試題

參考用

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24. Which of the following represents a correct order of the events that occur during the respiration of glucose in the absence of oxygen? (a) Glycolysis; citric acid cycle; oxidative phosphorylation (b) glycolysis; oxidative phosphorylation; citric acid cycle (c) oxidative phosphorylation; citric acid cycle; glycolysis (d) glycolysis; fermentation (e) None
25. The key enzyme in the regulation of fatty acid synthesis is (a) acetyl CoA carboxylase (b) AMP activated protein kinase (c) protein phosphatase (d) hexokinase (e) None.
26. Which of the following pathways takes place primarily within the inner mitochondrial membrane? (a) fatty acid beta-oxidation (b) electron transport (c) glycolysis (d) citric acid cycle (e) pentose phosphate pathway
27. What happens after glycolysis when oxygen is available as an electron acceptor? (a) pyruvate (b) NADH is produced (c) fermentation (d) oxidative phosphorylation (e) None.
28. Which of the following coenzymes is required for decarboxylation of pyruvate by the pyruvate dehydrogenase complex? (a) thiamine pyrophosphate (b) coenzyme A (c) lipoic acid (d) NAD^+ (e) FAD
29. Which of the following amino acids is considered as both ketogenic and glucogenic? (a) Valine (b) Tryptophan (c) Lysine (d) None (e) All of the above.
30. Of the following molecules derived from amino acids, which is used to transport amino acid across the cell membrane? (a) glutathione (b) γ -aminobutyric acid (c) S-adenosylmethionine (d) nitric acid (e) thyroxine
31. Which of the following compounds belong to vitamin B₆ group? (a) Pyridoxal (b) Pyridoxine (c) Pyridoximine (d) All of the above (e) None
32. In reverse phase chromatography, the stationary phase is made (a) non-polar (b) polar (c) either non-polar or polar (d) ionic (e) None
33. Ascorbic acid acts as an (a) reducing agent (b) oxidizing agent (c) oxidizing and reducing agent both (d) none of the above
34. Lactic acid is produced by human muscle during strenuous exercise because of lack of (a) oxygen (b) NAD^+ (c) glucose (d) ADP and Pi (e) None
35. Which of the following is the major regulation point for transport of fatty acids into the mitochondria? (a) long chain fatty acid specific acyl-CoA synthetase (b) medium chain fatty acid specific acyl-coA synthetase (c) short chain fatty acid specific acyl-CoA synthetase (d) carnitine acyltransferase I (e) carnitine acyltransferase II
36. Coenzyme Q is involved in electron transport as? (a) a lipid-soluble electron carrier (b) a water-soluble electron donor (c) covalently attached cytochrome cofactor (d) directly to O_2 (e) None.
37. In aerobic respiration, the compound that enters a mitochondria (a) acetyl CoA (b) pyruvate (c) phosphoglyceraldehyde (d) oxaloacetate (e) None
38. The carbon dioxide is primary a product of (a) Krebs cycle (b) glycolysis (c) electron transport phosphorylation (d) lactate fermentation (e) None.

二、簡答題(每題6分;共24分)

1. Please describe the major contributions made by the following scientists: (a) Sidney Altman (b) Linus Pauling (c) Kary Mullis
2. Please specify the following terms of enzyme kinetics and their units: (a) K_M (b) k_{cat} (c) k_{cat}/K_M
3. Please describe the differences between substrate phosphorylation and oxidative phosphorylation.
4. Please describe the β -oxidation of lipids and how the lipid metabolism produces ATP?

注意：背面有試題

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