

參考用

一. 單選題(每題 2 分; 共 76 分)

1. Oseltamivir (marketed as *Tamiflu*), a structural analogue of sialic acid, is a strong inhibitor of _____. (a) neuraminidase (b) hemagglutinin (c) RNA polymerase (d) reverse transcriptase (e) protease.
2. Which description about Hb (hemoglobin) is correct? (a) HbA has an $\alpha_2\beta_2$ structure (b) HbF has an $\alpha_2\gamma_2$ structure (c) HbA has a much higher affinity for BPG than does HbF (d) CO_2 reduces the binding affinity of HbA for O_2 (e) All of the above.
3. Which of the followings is NOT the major lipid component of biological membranes? (a) glycerophospholipids (b) sphingolipids (c) glycosphingolipids (d) cholesterol (e) glycoglycerolipids
4. An α helix of a polypeptide has a pitch of ____ nm/turn. (a) 3.6 (b) 0.15 (c) 0.54 (d) 0.34 (e) 3.4.
5. All α -amino acids except ____ contain an asymmetric α -carbon. (a) Pro (b) Lys (c) Trp (d) Phe (e) Gly.
6. Which of the following compounds has the highest molecular weight? (a) adenine (b) adenosine (c) adenylate (d) uracil (e) uridine.
7. Which of the following restriction endonucleases has a cohesive end compatible with that of SpeI (ACTAGT) 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 discovery of PCR? (a) L. Pauling (b) J. D. Watson and H. C. Crick (c) K. B. Mullis (d) A. D. Hershey and M. Chase (e) R. Franklin.
9. The $\text{p}K_a$'s of the carboxylic acid and amino groups of the α -amino acids are about ____ and ____, respectively. (a) 1 and 6 (b) 7 and 7 (c) 6 and 8 (d) 10 and 2 (e) 2 and 10.
10. Lactose is a disaccharide linked by a $\beta(1\rightarrow4)$ linkage. This linkage is chemically an (a) ester (b) ether (c) amide (d) aldehyde (e) aldose.
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 methionine? (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. Fibroin is a β sheet protein. Almost half of its residues are _____. (a) Gly (b) Ala (c) Ser (d) Lys (e) Glu
15. Chitin 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 predominant carbohydrate in honey is _____. (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 eukaryotic organelles? (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. The isocitrate lyase-catalyzed reaction cleaves isocitrate into (a) glyoxylate and fumarate (b) succinate and acetyl-CoA (c) malate and acetyl-CoA (d) succinate and glyoxylate (e) glyoxylate and acetyl-CoA.
20. In animals, all nitrogen and carbon of heme groups comes from the reaction of the amino acid ____ and _____. (a) glutamate; malonyl-CoA (b) aspartate; acetyl-CoA (c) asparagine; propionyl-CoA (d) glycine; succinyl-CoA (e) alanine; methylmalonyl-CoA
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. What is the correct order of enzyme activities required for nucleotide excision repair? (a) exonuclease, helicase, polymerase, ligase (b) endonuclease, helicase, polymerase, ligase (c) exonuclease, helicase, ligase, polymerase (d) endonuclease, helicase, ligase, polymerase (e) none of the above
23. What is the approximately P/O ratio if the source of electrons for the electron transport chain is FADH_2 ? (a) 1 (b) 1.5 (c) 2

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(d) 2.5 (e) 3

24. In addition to iron, what metals is found in certain cytochromes? (a) manganese (b) copper (c) chromium (d) cobalt (e) zinc
25. Bilirubin is conjugated with ___ to increase its solubility for excretion. (a) phospholipids (b) glycine (c) glucuronic acid (d) taurine (e) all of the above.
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. The introduction of DNA into a bacteria cell by first packaging the DNA into a phage particle is referred as (a) transduction (b) transformation (c) transposition (d) conjugation (e) illegitimate recombination
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. What molecule contributes at least two nitrogen atoms to each purine? (a) asparagines (b) 10-formyltetrahydrofolate (c) glycine (d) glutamine (e) carbomoyl phosphate
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. What process in the brain consumes most of the ATP that is produced? (a) movement of actin/myosin (b) maintenance of membrane potentials (c) active transport of glucose and amino acids (d) cellular growth (e) none of the above
32. The end products of the pyrimidine catabolic pathway are ammonia, carbon dioxide and ___. (a) asparagines, (b) aspartic acid (c) dihydrouracil (d) beta-alanine (e) glutamine
33. Which of the following correctly explains the covalent modification used to control glutamine synthetase? (a) uridyldylation activates, deuridyldylation inhibits (b) uridyldylation inhibits, deuridyldylation activates (c) adenylaiton activates, deadenylation inhibits (d) adenylaiton inhibits, deadenylation activates (e) phosphorylation inhibits, dephosphorylation activates
34. Most steroid hormones exert their effects by initial binding to which of the following receptors? (a) receptor in cell membrane (b) receptor in cytosol (c) receptor in nuclear membrane (d) receptor in nucleus (e) none of the above
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. Which of the following would be considered a biosynthetic pathway? (a) glycolysis (b) glycogen synthesis (c) fatty acid beta-oxidation (d) citric acid cycle (e) electron transport
37. Which of the following roles dose the liver play in lipoprotein metabolism? (a) production of chylmicrons (b) uptake of VLDL (c) production of LDL (d) uptake of HDL (e) none of the above
38. Which of the following leads to the formation of atherosclerotic plaques? (a) non-specific interaction between LDL particles (b) oxidation of LDL particles resulting in crossing linking with proteins (c) uptake of oxidized LDL particles by macrophages (d) excess uptake of LDL particles converting endothelial cells to foam cells (e) none of the above.

二、簡答題(每題6分；共24分)

1. Please specify the functions and action mechanisms of the following compounds: (a) TPCK (N-Tosyl-L-phenyl-alaninechloro-methyl ketone) (b) fluoroacetate (c) 2,3-Bisphosphoglycerate
2. Please specify the following terms of enzyme kinetics: (a) K_M (b) k_{cat} (c) k_{cat}/K_M
3. Please describe how uric acid is formed in the body.
4. Please describe the metabolic inter-conversion among glucose, lipid, and protein.

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