

## 一. 單選題(每題 2.5 分；共 100 分)

1. The sweetness of honey comes mainly from \_\_\_\_\_. (A) sucrose (B) maltose (C) glucose (D) galactose (E) fructose.
2.  $\alpha$  helix of a polypeptide has \_\_\_\_ residues per turn. (A) 1 (B) 2 (C) 3 (D) 3.6 (E) 5.4.
3. Which of the following descriptions about Hb (hemoglobin) is incorrect? (A) One Hb can bind 4  $O_2$  molecules (B) HbA has an  $\alpha_2\beta_2$  structure (C) HbF has an  $\alpha_2\gamma_2$  structure (D) HbF has a higher affinity for BPG than does HbA (E) Reducing the pH decreases the binding affinity of Hb for  $O_2$ .
4. Which of the following descriptions about the Michaelis-Menten rate equation is incorrect? (A)  $K_M$  measures the substrate concentration at which the reaction rate is  $V_{max}$  (B)  $k_{cat}$  is the turnover number that measures the rate of the catalytic process (C) The ratio  $k_{cat}/K_M$  is a convenient measure of enzyme efficiency (D)  $k_{cat} = V_{max}/[E]_t$  (E) A competitive inhibitor increases the apparent  $K_M$ .
5. To visualize a protein band, \_\_\_\_ is commonly used to stain proteins after SDS-polyacrylamide gel electrophoresis. (A) Uridine (B) EtBr (C) coomassie brilliant blue (D) CNBr (E) BUdR.
6. A DNA segment of 1,000 base pairs in the B form. What is its approximate molecular weight? (A) 33 (B) 65 (C) 330 (D) 650 (E) 3,300 kD.
7. Absorbance at \_\_\_\_ nm is frequently used to determine the concentration of protein. (A) 200 (B) 260 (C) 280 (D) 400 (E) 540.
8. Which of the following compounds has the highest molecular weight? (A) adenine (B) adenosine (C) adenylate (D) uracil (E) uridine.
9. Which of the following descriptions regarding disaccharide is incorrect? (A) Sucrose is  $\alpha$ -D-glucopyranosyl (1 $\rightarrow$ 4)  $\beta$ -D-fructofuranoside (B) Sucrose is a non-reducing sugar (C) Maltose has an  $\alpha$ (1 $\rightarrow$ 4) linkage (D) Cellobiose is  $\beta$ -D-glucopyranosyl (1 $\rightarrow$ 4)  $\beta$ -D-glucopyranose (E) Lactose is a reducing sugar.
10. Which of the following restriction endonucleases is an isoschizomer of BglII (AGATCT)? (A) EcoRI (GAATTC) (B) SpeI (ACTAGT) (C) BamHI (GGATCC) (D) SalI (GTCGAC) (E) EagI (CGGCCG).
11. Which scientist made a significant contribution to the discovery of prion? (A) K. B. Mullis (B) J. D. Watson and H. C. Crick (C) A. D. Hershey and M. Chase (D) S. B. Prusiner (E) G. N. Ramachandran.
12. TWEEN 20 is a nonionic surfactant that denatures proteins by disrupting \_\_\_\_? (A) hydrogen bonds (B) disulfide bridges (C) hydrophobic interactions (D) salt bridges (E) covalent bonds.
13. How many stereoisomers for an aldopentose? (A) 2 (B) 4 (C) 6 (D) 8 (E) 16.
14. The chemical bond between ribose and base of a nucleotide is a(n) \_\_\_\_\_. (A) Ether (B) Ester (C) glycoside (D) Aldehyde (E) Ketone.
15. Which of the following lipids are especially common in the membranes of brain and nerve cells? (A) glycerophospholipids (B) waxes (C) fatty acids (D) glycosphingolipids (E) glycylycerolipids.
16. T $\psi$ C loops are found in (A) mRNA (B) rRNA (C) tRNA (D) hnRNA (E) snRNA.
17. The catalytic triad of serine proteases consists of \_\_\_\_\_, \_\_\_\_\_, and \_\_\_\_\_? (A) Ser, His, and Asp (B) Phe, Trp, and Tyr (C) Asp, Glu, and Pro (D) His, Asp, and Glu (E) Ser, Thr, and Cys.
18. Which scientist proposed the model of chemiosmotic coupling? (A) P. Mitchell (B) J. D. Watson and H. C. Crick (C) A. D. Hershey and M. Chase (D) S. B. Prusiner (E) F. Sanger.

19. Which of the following amino acids contains only one codon? (A) Ala (B) Lys (C) Tyr (D) Met (E) Arg.
20. B form DNA has a pitch of \_\_\_ nm per turn. (A) 0.34 (B) 0.54 (C) 3.4 (D) 5.4 (E) 10
21. The Northern blotting method is normally used for detection of (A) proteins (B) DNA (C) RNA (D) lipids (E) carbohydrates.
22. Which of the following tautomeric forms is the major form of fructose in solution? (A)  $\alpha$ -pyranose (B)  $\beta$ -pyranose (C)  $\alpha$ -furanose (D)  $\beta$ -furanose (E) all of the above.
23. Which codon is most commonly used as the initiation codon in *E. coli*? (A) AAA (B) TTT (C) CCC (D) GGG (E) ATG.
24. Which of the following compounds is frequently used by emergency medical personnel as an antidote for cyanide poisoning? (A) CO (B) rotenone (C) antimycin A (D) azide (E)  $\text{NaNO}_2$
25. Which pair of enzymes listed below generates NADPH? (A) glucose-6-phosphate dehydrogenase and 6-phosphogluconate dehydrogenase (B) malic enzyme and glucose-6-phosphate dehydrogenase (C) citrate lyase and malic enzyme (D) 6-phosphogluconate dehydrogenase and fructose-bisphosphatase-1 (E) fructose-bisphosphatase-1 and hexose kinase.
26. How many  $\text{CO}_2$  molecules are released for each acetyl-CoA entering the glyoxylate cycle in plant cells? (A) 0 (B) 1 (C) 2 (D) 3 (E) 4.
27. The most important regulatory step in glycolysis is catalyzed by \_\_\_. (A) hexokinase (B) pyruvate kinase (C) glyceraldehyde-3-phosphate dehydrogenase (D) phosphofructokinase (E) phosphoglycerate kinase.
28. Which of the following reactions is not located in mitochondria? (A) tricarboxylic acid cycle (B) electron transport (C) glyoxylate cycle (D)  $\beta$ -oxidation (E) oxidative phosphorylation.
29. In a Lineweaver-Burk double reciprocal plot, the intercept of the y-axis equals \_\_\_. (A)  $K_M$  (B)  $-1/K_M$  (C)  $V_{\max}$  (D)  $1/V_{\max}$  (E)  $k_{\text{cat}}/K_M$ .
30. Phosphofructokinase-1 (A) is activated by ADP and citrate (B) is inhibited by ATP and citrate (C) is activated by citrate and fructose-2,6-bisphosphate (D) is activated by ATP and fructose-2,6-bisphosphate (E) is inhibited by ATP and fructose-2,6-bisphosphate
31. Which amino acid often plays a role in turns or in breaking  $\alpha$  helices? (A) Gly (B) Trp (C) Tyr (D) His (E) Pro.
32. Amino acids can be covalently linked together by formation of a(n) \_\_\_ bond. (A) ether (B) ester (C) amide (D) glycosidic (E) none of the above.
33. How many moles of NADH molecules are produced in the TCA cycle per molecule of acetyl-CoA oxidized? (A) 5 (B) 4 (C) 3 (D) 2 (E) 1.
34. The 21<sup>st</sup> and 22<sup>nd</sup> amino acids are \_\_\_ and \_\_\_? (A) serine and phosphoserine (B) proline and 4-hydroxyproline (C)  $\alpha$ -alanine and  $\beta$ -alanine (D) D-alanine and L-alanine (E) selenocysteine and pyrrolysine.
35. Which enzyme uses  $\text{NAD}^+/\text{NADH}$  in the metabolism of glucose to  $\text{CO}_2$ ? (A) pyruvate dehydrogenase complex (B) isocitrate dehydrogenase (C)  $\alpha$ -ketoglutarate dehydrogenase (D) malate dehydrogenase (E) all of the above.
36. Which of the following scientists made a significant contribution to the sequencing of insulin? (A) K. B. Mullis (B) J. D. Watson and H. C. Crick (C) F. Sanger (D) S. Altman and T. Cech (E) S. B. Prusiner.

37. All of the following are paired with their preferred substrate except: (A) brain: fatty acids (B) heart: fatty acids (C) anaerobic skeletal muscle: glucose (D) red blood cell: glucose (E) adipose tissue: fatty acids.
38. tRNA maturation in eukaryotes includes (A) RNase P cleavage (B) intron splicing (C) CCA tail addition (D) base modifications (E) all of the above.
39. Who proposed the binding-changing model for the  $F_0F_1$  ATP synthase complex? (A) P. Boyer (B) F. Sanger (C) W. Gilbert (D) J. Walker (E) T. Cech.
40. Only the \_\_\_ tautomeric form of ribose exists in RNA structure? (A)  $\alpha$ -pyranose (B)  $\beta$ -pyranose (C)  $\alpha$ -furanose (D)  $\beta$ -furanose (E) all of the above.