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※請在答案卡內作答

參考用

一. 單選題(每題2.5分；共100分)

1. How many different codons are expected to exist in the genome of *Aquifex aeolicus* (an extreme thermophile)? (A) < 10 (B) < 20 (C) < 30 (D) < 40 (E) < 80.
2. α helix of a polypeptide has a pitch (height per turn) of (A) 0.10 (B) 0.15 (C) 0.34 (D) 0.54 (E) 1 nm.
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 lower affinity for BPG than does HbA (E) CO_2 increases 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 $V_{max}/2$ (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) $V_{max} = k_{cat}/K_M$ (E) A competitive inhibitor increases the apparent K_M.
5. To visualize a DNA fragment, ___ is commonly used to stain DNA after agarose gel electrophoresis. (A) Uridine (B) EtBr (C) NADH (D) CNBr (E) BUdR.
6. A DNA segment of 1,000 base pairs in the A 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 DNA. (A) 200 (B) 260 (C) 280 (D) 400 (E) 540.
8. Which of the following compounds has the highest molecular weight? (A) guanine (B) guanosine (C) guanylate (D) uracil (E) uridine.
9. Which of the following descriptions regarding disaccharide is incorrect? (A) Sucrose is α-D-glucopyranosyl (1→2) β-D-fructofuranoside (B) Sucrose is a reducing sugar (C) Maltose has an α(1→4) linkage (D) Cellobiose is β-D-glucopyranosyl (1→4) β-D-glucopyranose (E) Lactose is a reducing sugar.
10. Which of the following restriction endonucleases is an isoschizomer of XhoI (CTCGAG)? (A) EcoRI (GAATTC) (B) SpeI (ACTAGT) (C) BamHI (GGATCC) (D) SalI (GTCGAC) (E) EagI (CGGCCG).
11. Which scientist made a significant contribution to the invention of PCR? (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. Triton X-100 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 a tetrose? (A) 2 (B) 4 (C) 6 (D) 8 (E) 16.
14. The chemical bond between ribose and phosphate of UMP is an ___. (A) Ether (B) Ester (C) Amide (D) Aldehyde (E) Ketone.
15. Which of the following lipids is not a major component of cellular membranes? (A) glycerophospholipids (B) sphingolipids (C) fatty acids (D) glycosphingolipids (E) glycoglycerolipid.
16. Anti-codon loops are found in (A) mRNA (B) rRNA (C) tRNA (D) hnRNA (E) snRNA.
17. Which of the following bond-pairs within a peptide backbone show free rotation around both bonds? (A) N-C_α and N-C (B) C_α-C and N-C_α (C) C=O and N-C (D) C=O and N-C_α (E) N-C and C_α-C.
18. Which scientist made a significant contribution to the technology of DNA sequencing? (A) K. B. Mullis (B) J. D. Watson and H. C. Crick (C) A. D. Hershey and M. Chase (D) S. B. Prusiner (E) F. Sanger.

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19. Which of the following amino acids contains only one codon? (A) Ala (B) Lys (C) Tyr (D) Trp (E) Arg.
20. B form DNA has a rise of ___ nm/residue. (A) 0.10 (B) 0.15 (C) 0.34 (D) 0.54 (E) 1
21. The Southern 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) α-pyranose (B) β-pyranose (C) α-furanose (D) β-furanose (E) all of the above.
23. The Shine-Dalgarno sequence is ____ in *E. coli*? (A) AATT (B) AAGG (C) ATGC (D) TTCC (E) TTGG.
24. Cyanide is poisonous, because it tightly binds ___ of the respiratory chain. (A) CoQ (B) cyt b (C) cyt c (D) cyt a (E) cyt a_3
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. Which pair of enzymes listed below is unique to the glyoxylate cycle? (A) pyruvate dehydrogenase and fructose-bisphosphatase-1 (B) pyruvate carboxylase and 3-phosphoglycerate kinase (C) PEPCK and pyruvate carboxylase (D) citrate lyase and malate synthase (E) pyruvate carboxylase and phosphofructokinase-1.
27. The major monosaccharides in coke are (A) glucose (B) fructose (C) galactose (D) glucose and fructose (E) galactose and fructose.
28. Which of the following reactions is <u>not</u> located in mitochondria? (A) tricarboxylic acid cycle (B) electron transport (C) glycolysis (D) β-oxidation (E) oxidative phosphorylation.
29. In a Lineweaver-Burk double reciprocal plot, the intercept of the x-axis equals ___. (A) K_M (B) $-1/K_M$ (C) V_{max} (D) $1/V_{max}$ (E) k_{cat}/K_M.
30. Phosphofructokinase-1 (A) is activated by ADP and citrate (B) is inhibited by ADP and citrate (C) is activated by citrate and fructose-2,6-bisphosphate (D) is activated by AMP and fructose-2,6-bisphosphate (E) is inhibited by ATP and fructose-2,6-bisphosphate
31. All α-amino acids except ___ contain an asymmetric α-carbon. (A) Gly (B) Ala (C) Ile (D) His (E) Met.
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 $FADH_2$ molecules are produced in the TCA cycle per molecule of acetyl-CoA oxidized? (A) 5 (B) 4 (C) 3 (D) 2 (E) 1.
34. Waxes are formed by esterification of ___ and ___? (A) fatty acids and glycerols (B) fatty acids and glucose (C) fatty acids and alcohols (D) fatty acids and glycerol-3-phosphate (E) fatty acids and sphingosine.
35. Which carbons are released first as CO_2 in the metabolism of glucose to CO_2? (A) carbons 1 and 2 (B) carbons 3 and 4 (C) carbons 5 and 6 (D) carbons 1 and 6 (E) none of the above.
36. Which of the following scientists made a significant contribution to the discovery of ribozymes? (A) K. B. Mullis (B) J. D. Watson and H. C. Crick (C) A. D. Hershey and M. Chase (D) S. Altman and T. Cech (E) S. B. Prusiner.

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37. All of the following are paired with their preferred substrate except: (A) brain: glucose (B) heart: fatty acids (C) anaerobic skeletal muscle: glucose (D) red blood cell: fatty acids (E) adipose tissue: fatty acids.
38. The adapter molecule that links an amino acid to its codon(s) is ___. (A) mRNA (B) rRNA (C) tRNA (D) ssRNA (E) miRNA.
39. A highly conserved protein that is involved in protein synthesis is (A) ricin (B) met-aminopeptidase (C) degradase (D) ubiquitin (E) peptidyl transferase.
40. Only the ___ tautomeric form of ribose exists in nucleic acid structure? (A) α-pyranose (B) β-pyranose (C) α-furanose (D) β-furanose (E) all of the above.