

國立中央大學 110 學年度碩士班考試入學試題

所別： 生命科學系 碩士班 生物醫學組(一般生)  
生命科學系 碩士班 生物醫學組(在職生)

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科目： 生物化學

本科考試禁用計算器

\*請在答案卷(卡)內作答

一. 單選題(每題 2.5 分; 共 100 分)

- How many different codons are normally used to decode the amino acid "tryptophan" in the genome of *E. coli*? (A) 0 (B) 1 (C) 2 (D) 4 (E) 6.
- A DNA (B form) has a pitch (height per turn) of (A) 0.15 (B) 0.54 (C) 0.34 (D) 3.4 (E) 10 nm.
- Which of the following descriptions about Hb (hemoglobin) is incorrect? (A) One Hb can bind 1 O<sub>2</sub> 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<sub>2</sub> decreases the binding affinity of Hb for O<sub>2</sub>.
- 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  $K_M/k_{cat}$  is a convenient measure of enzyme efficiency (D)  $K_M$  is the Michaelis constant (E) A competitive inhibitor increases the apparent  $K_M$ .
- Which of the following compounds is commonly used to stain proteins after SDS-PAGE? (A) EtBr (B) Coomassie brilliant blue (C) Cyber Green (D) CNBr (E) BUdR.
- A single-stranded DNA segment of 1,000 bases in the A form. What is its approximate molecular weight? (A) 33 (B) 65 (C) 330 (D) 650 (E) 3,300 kD.
- Absorbance at \_\_\_ nm is frequently used to determine the concentration of proteins. (A) 200 (B) 260 (C) 280 (D) 400 (E) 540.
- Which of the following compounds has the highest molecular weight? (A) adenine (B) adenosine (C) adenylate (D) uracil (E) uridine.
- Which of the following descriptions regarding disaccharide is incorrect? (A) Sucrose is  $\alpha$ -D-glucopyranosyl (1 $\rightarrow$ 2)  $\beta$ -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 non-reducing sugar.
- Which of the following restriction endonucleases is an isoschizomer of SpeI (ACTAGT)? (A) EcoRI (GAATTC) (B) XbaI (TCTAGA) (C) BamHI (GGATCC) (D) SalI (GTCGAC) (E) EagI (CGGCCG).
- Which scientists proved that the genetic material is DNA, instead of proteins? (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.
- 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.
- How many stereoisomers for an aldopentose? (A) 2 (B) 4 (C) 6 (D) 8 (E) 16.
- A phosphate is attached to a ribose through a \_\_\_ bond in DNA. (A) Ether (B) Ester (C) Amide (D) Aldehyde (E) Ketone.
- Which of the following lipids is not a major component of cellular membranes? (A) glycerophospholipids (B) sphingolipids (C) stearic acids (D) glycosphingolipids (E) glycolipid.
- T $\Psi$ C loops are found in (A) mRNA (B) rRNA (C) tRNA (D) hnRNA (E) snRNA.
- Which of the following bond-pairs within a peptide backbone show free rotation around both bonds? (A) N-C $\alpha$  and N-C (B) C $\alpha$ -C and N-C $\alpha$  (C) C=O and N-C (D) C=O and N-C $\alpha$  (E) N-C and C $\alpha$ -C.

注意:背面有試題

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18. 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) F. Sanger.
19. Which of the following amino acids contains only one codon? (A) Ala (B) Lys (C) Tyr (D) Met (E) Arg.
20. In the universal codon table, how many of them are "nonsense codons"? (A) 0 (B) 1 (C) 2 (D) 3 (E) 4
21. The Western 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 glucose in solution? (A)  $\alpha$ -pyranose (B)  $\beta$ -pyranose (C)  $\alpha$ -furanose (D)  $\beta$ -furanose (E) all of the above.
23. The ribosome-binding site has a sequence of \_\_\_\_ in *E. coli*? (A) AATT (B) AAGG (C) ATGC (D) TTCC (E) TTGG.
24. \_\_\_\_ is poisonous, because it blocks electron flow from NADH to CoQ in the respiratory chain. (A) Rotenone (B) Antimycin A (C) Cyanide (D) Azide (E) CO
25. Which of the following compounds is a suicide inhibitor of aconitase? (A) citrate (B) fluoroacetate (C) isocitrate (D) acetyl-CoA (E) FADH<sub>2</sub>.
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 honey are (A) glucose and galactose (B) fructose and galactose (C) galactose and mannose (D) glucose and fructose (E) galactose and fructose.
28. Which of the following reactions is not located in mitochondria? (A) gluconeogenesis (B) tricarboxylic acid cycle (C) electron transport (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)  $k_{cat}/K_M$ .
30. Phosphofructokinase-1 (PFK-1) (A) is activated by ADP (B) is activated by citrate (C) is activated by fructose-2,6-bisphosphate (D) is inhibited by AMP (E) is inhibited by ADP.
31. All  $\alpha$ -amino acids except \_\_\_\_ contain an asymmetric  $\alpha$ -carbon. (A) Gly (B) Ala (C) Ile (D) His (E) Met.
32. A base (purine or pyrimidine) can be covalently linked to a ribose through a \_\_\_\_ bond in DNA. (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. Waxes are formed by \_\_\_\_ of fatty acids and alcohols? (A) phosphorylation (B) methylation (C) esterification (D) amino (E) none of the above.
35. Which carbons are released first as CO<sub>2</sub> in the metabolism of glucose to CO<sub>2</sub>? (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.

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36. Which of the following scientists made a significant contribution to DNA sequencing? (A) K. B. Mullis (B) J. D. Watson and H. C. Crick (C) A. D. Hershey and M. Chase (D) F. Sanger and W. Gilbert (E) S. B. Prusiner.
37. All of the following are paired with their preferred substrate except: (A) brain: fructose (B) heart: fatty acids (C) anaerobic skeletal muscle: glucose (D) red blood cell: glucose (E) adipose tissue: fatty acids.
38. Which of the following scientists proposed "chemiosmotic coupling"? (A) P. Mitchell (B) F. Sanger (C) K. B. Mullis (D) P. Boyer (E) J. Walker.
39. Lactase ( $\beta$ -galactosidase) contains a structure of \_\_\_\_\_. (A) monomer (B) dimer (C) trimer (D) tetramer (E) none of the above.
40. Ribose exists in RNA as the structure of \_\_\_\_\_. (A)  $\alpha$ -pyranose (B)  $\beta$ -pyranose (C)  $\alpha$ -furanose (D)  $\beta$ -furanose (E) all of the above.