

## 九十五學年度轉學招生考試試題紙

學系別	考試科目	考試日期	時 間
生物科技與生物資訊學系 (生物科技組)大學部三年級	生物化學	95.7.29	10:20-12:00

### 單選題 (每題2.5分)

1. How do catalysts work to accelerate a chemical reaction?
  - a. They raise the average energy of the reactants
  - b. They provide a means of acceleration by being completely consumed in the reaction
  - c. They lower the energy of activation
  - d. They lower the overall free energy change of the reaction
  - e. They raise the overall free energy change of the reaction
  
2. The specific site on the enzyme where \_\_\_\_\_ binds and catalysis occurs is called the \_\_\_\_\_ site.
  - a. coenzyme; substrate
  - b. substrate; active
  - c. coenzyme; regulatory
  - d. regulatory; active
  - e. none of these choices
  
3. Enzymes have active sites which have the greatest complementarity to the:
  - a. substrate
  - b. transition state
  - c. product
  - d. both substrate and product
  - e. none of these choices
  
4. Nucleophilic centers for covalent catalysis include all of the following amino acid side-chains in proteins EXCEPT:
  - a. methyl
  - b. amines
  - c. carboxylate
  - d. aryl and alkyl hydroxyls
  - e. thiols
  
5. The catalytic triad common to many serine proteases involves shuttling of protons between (sequence in the catalytic triad):
  - a. ser-his-asp
  - b. his-ser-asp
  - c. ser-his-his
  - d. ser-asp-his
  - e. cys-his-ser

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6. All are characteristic of allosteric enzymes EXCEPT:
- Effectors may show stimulatory or inhibitory activity
  - They have multiple subunits
  - They obey Michaelis-Menten kinetics
  - The regulatory effect is by altering conformation and interaction of subunits
  - Binding one subunit impacts binding of substrate to other subunits
7. For muscle glycogen phosphorylase,  $P_i$  (inorganic phosphate) is a:
- positive homotropic effector.
  - negative homotropic effector.
  - positive heterotropic effector.
  - negative heterotropic effector.
  - none of these choices.
8. Hexokinase and glucokinase belong to the kinase subclass of what class of enzymes?
- oxidoreductase
  - isomerase
  - transferase
  - hydrolase
  - lyase
9. In the second half of the glycolytic pathway, \_\_\_\_\_ new ATP molecules are produced and with the offset of \_\_\_\_\_ ATPs consumed in phase 1, the net yield is \_\_\_\_\_ ATPs per glucose.
- four; four; zero
  - four; two; two
  - two; two; four
  - two; one; one
  - four; one; three
10. In eukaryotic cells, glycolysis occurs in the \_\_\_\_\_, and the TCA cycle reactions take place in \_\_\_\_\_.
- mitochondria; mitochondria
  - cytoplasm; mitochondria
  - cytoplasm; cytoplasm
  - mitochondria; ribosomes
  - cytoplasm; ribosomes

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11. The \_\_\_\_\_ of pyruvate to acetyl-CoA is catalyzed by \_\_\_\_\_.
  - a. dehydration; pyruvate dehydration complex
  - b. oxidative decarboxylations; pyruvate dehydrogenase complex
  - c. decarboxylations; pyruvate decarboxylase
  - d. transacylation; pyruvate transacylase
  - e. none of these choices.
  
12. How many NADH molecules are produced in the TCA cycle per molecule of acetyl-CoA oxidized?
  - a. 1
  - b. 2
  - c. 3
  - d. 4
  - e. 5
  
13. All of the following are in the mitochondria EXCEPT:
  - a. enzymes for fatty acid oxidation
  - b. adenylate kinase
  - c. creatine kinase
  - d. the electron transport complexes
  - e. pentose phosphate pathway
  
14. Where does the energy that drives ATP synthesis come from?
  - a. The proton gradient
  - b.  $\text{NAD}^+$  and FAD
  - c. The electron gradient
  - d. The oxidation states of the complexes
  - e. Molecular oxygen
  
15. The final electron acceptor in the electron transport chain is:
  - a. molecular oxygen
  - b.  $\text{H}_2\text{O}$
  - c. cytochrome c
  - d. UQ
  - e.  $\text{NAD}^+$

# 亞洲大學

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16. The pentose phosphate pathway is the primary source for \_\_\_\_\_, and for \_\_\_\_\_, an essential precursor for ATP,  $\text{NAD}^+$ , FAD, CoA, DNA and RNA.

- a. ATP; NADH
- b. NADH; NADPH
- c. NADPH; ribose-5-phosphate
- d. ribose-5-phosphate; ATP
- e. all are true

17. \_\_\_\_\_ carries long-chain fatty acyl groups across the \_\_\_\_\_ membrane.

- a. Biotin; intestinal
- b. Carnitine; plasma
- c. CoA-SH; plasma
- d. Carnitine; inner mitochondrial
- e. TPP; outer mitochondrial

18. For the complete oxidation of a saturated fatty acid with 16 carbons, how many times must the  $\beta$ -oxidation cycle be repeated?

- a. 4
- b. 7
- c. 8
- d. 6
- e. 16

19. How many  $\text{NAD}^+$  are reduced in the  $\beta$ -oxidation of stearoyl-CoA to form nine molecules of acetyl-CoA?

- a. 18
- b. 16
- c. 12
- d. 9
- e. 8

20. Ketone body carbons enter the major metabolic pathways of the cells utilizing ketone bodies at:

- a. acetyl-CoA
- b. butyrate
- c. citrate
- d. pyruvate
- e. glucose-6-phosphate

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21. DNA is replicated by a \_\_\_\_\_ mechanism.
  - a. dispersive
  - b. conservative
  - c. semiconservative
  - d. liberal
  - e. none of these choices
22. Removal of RNA primer and replacement with DNA is carried out by:
  - a. DNA polymerase I
  - b. DNA gyrase
  - c. DNA polymerase III
  - d. DNA ligase
  - e. primerase
23. Misincorporation of all subsequent amino acids are called \_\_\_\_\_ mutations.
  - a. chemical
  - b. base shift
  - c. frame shift
  - d. transition
  - e. all are true
24. The enzyme that seals nicks in dsDNA where a 3'-OH and 5'-phosphate are juxtapositioned is:
  - a. DNA polymerase I
  - b. DNA gyrase
  - c. DNA polymerase III
  - d. DNA ligase
  - e. primerase
25. Nucleotide sequences that identify the location of transcription start sites and regulate the level of transcription are called:
  - a. sigma factors
  - b. Pribnow boxes
  - c. TATA boxes
  - d. promoters
  - e. enhancers

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26. Nucleotides in the "minus" direction are said to lie \_\_\_\_\_ of the transcription start site.

- a. downstream
- b. upstream
- c. downwind
- d. upwind
- e. downstairs

27. The stand of dsDNA that is read by RNA polymerase is termed the \_\_\_\_\_ strand with RNA polymerase moving \_\_\_\_\_ along it making \_\_\_\_\_ growing in the \_\_\_\_\_ direction.

- a. template; 5' → 3'; transcript; 3' → 5'
- b. template; 3' → 5'; transcript; 5' → 3'
- c. transcript; 3' → 5'; template; 5' → 3'
- d. nontemplate; 5' → 3'; template; 3' → 5'
- e. nontemplate; 3' → 5'; template; 5' → 3'

28. The adapter molecules that interact specifically with both nucleic acids and amino acids to bridge the informational gap are:

- a. rRNA
- b. tRNA
- c. mRNA
- d. ssRNA
- e. all are true

29. \_\_\_\_\_ are the agents of protein synthesis.

- a. Nuclei
- b. Mitochondria
- c. Chloroplasts
- d. Ribosomes
- e. Plasma membranes

30. The genetic code is said to be degenerate, which means that:

- a. Each codon codes for more than one amino acid
- b. An anticodon can interact with more than one codon in the mRNA in which the codon may differ in any or all of the three nucleotides
- c. Most amino acids are coded for by more than one codon
- d. The code is universally used by virtually all species
- e. None are true

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31. The main source(s) of NADPH for fatty acid biosynthesis is (are):
  - a. TCA cycle
  - b. oxidative phosphorylation
  - c. malic enzyme and the pentose phosphate pathway
  - d. the conversion of OAA to malate by malate dehydrogenase
  - e. glycolysis
32. A lipid that does NOT have a sphingosine backbone is:
  - a. ganglioside GM<sub>1</sub>
  - b. sphingomyelin
  - c. phosphatidylinositol
  - d. ceramide
  - e. cerebroside
33. Glutamic acid has pK<sub>a</sub>s at 2.2, 4.3 and 9.7. Calculate the isoelectric point for glutamic acid.
  - a. 3.25
  - b. 4.3
  - c. 5.4
  - d. 7.0
  - e. 8.6
34. The peptide bond has partial \_\_\_\_\_ character.
  - a. hydrogen bond
  - b. double bond
  - c. triple bond
  - d. van der Waals bond
  - e. all of these choices
35.  $\alpha$ -Helix and  $\beta$ -strand are components of \_\_\_\_\_ structure.
  - a. primary
  - b. secondary
  - c. tertiary
  - d. quaternary
  - e. all are true



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36. What is the overall net charge on the peptide lys-lys-ser-glu at pH 7.0?
- +2
  - +1
  - 0
  - 1
  - 2
37. The amino acid residue most likely to be found in a beta turn is:
- glycine
  - alanine
  - valine
  - glutamic acid
  - leucine
38. If carbon 1 is the carbonyl group of an aldohexose, which carbon determines if the sugar is a D- or L- stereoisomer?
- 1
  - 2
  - 3
  - 4
  - 5
39. All of the following disaccharides are reducing sugars EXCEPT:
- lactose
  - maltose
  - sucrose
  - cellulose
  - isomaltose
40. All are true for the DNA double helix EXCEPT:
- the two strands are parallel
  - the two strands are held together by interchain hydrogen bonds
  - the two strands have complementary base pairing
  - they are easily sheared into shorter fragments during isolation procedures
  - all are true