

亞洲大學

九十五學年度碩士班招生考試試題紙

系 所 別	組 別	考試科目	考試日期	時 間	備 註
生物科技與生物資訊學系碩士班	生物資訊組 生物科技組	生物化學	95.4.30	10:30-12:10	共六頁

Multiple Choice Question (單選題): 2 points each

- Which of the following is the inhibitor for alternative purine synthesis?
(A) guanine (B) hypoxanthine (C) aminopterin (D) thymidine
- If the fifth carbon of the glucose is labeled with radioisotope, which of the following is not radioactive?
(A) glyceraldehyde-3-phosphate (B) dihydroxyacetone phosphate
(C) pyruvate (D) phosphoenolpyruvate
- Which of the following proceeds at the inner membrane of mitochondria?
(A) succinate→fumarate (B) phosphoenolpyruvate→pyruvate
(C) glucose-6-phosphate→glucose (D) none of the above
- Continuing from the above question, how many ATP can the energy generated through this process be converted to through electron transport and oxidative phosphorylation in mammalian cells?
(A) 0.5 ATP (B) 1.5 ATP (C) 2.5 ATP (D) 3.5 ATP
- Continuing from the above question, the sequence for the electron transport chain will be :
(A) Complex I → coenzyme Q → complex III → cytochrome c → complex IV
(B) Complex II → coenzyme Q → complex III → cytochrome c → complex IV
(C) Complex III → coenzyme Q → complex II → cytochrome c → complex IV
(D) Complex IV → coenzyme Q → complex III → cytochrome c → complex I
- The major difference between saturated and unsaturated fatty acid catabolism is:
(A) cis-trans isomerization (B) cis-trans translocation
(C) cis-trans dehydration (D) cis-trans hydration
- Which is not the chain lengthening site for fatty acid synthesis?
(A) endoplasmic reticulum (B) mitochondria
(C) cytosol (D) none of the above
- Which of the following is the key compound for Edman degradation method?
(A) Phenyl isothiocyanate (B) polyacrylamide
(C) agarose (D) dextran
- The second dimensional separation in two-dimensional gel electrophoresis is to separate the molecule based on:
(A) the size (B) the net charge
(C) the structure (D) the affinity
- Which linkage is NOT in a glycogen molecule?
(A) $\alpha(1\rightarrow4)$ (B) $\beta(1\rightarrow4)$
(C) $\alpha(1\rightarrow6)$ (D) None of the above

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11. Which molecule is involved in glycogen synthesis?
 (A) GTP (B) CTP (C) ATP (D) UTP
12. Which of the following can NOT pass through mitochondria?
 (A) Pyruvate (B) oxaloacetate (C) malate (D) citrate
13. Which reaction is mediated by GTP?
 (A) pyruvate → oxaloacetate
 (B) oxaloacetate → phosphoenolpyruvate
 (C) acetyl CoA → pyruvate (D) malate → oxaloacetate
14. When the cell is in need for more energy, then:
 (A) bypassing the sugar generation stage of pentose phosphate pathway
 (B) bypassing the oxidative stage of pentose phosphate pathway
 (C) bypassing both the sugar generation and the oxidative stages of pentose phosphate pathway
 (D) completing both the sugar generation and the oxidative stages of pentose phosphate pathway
15. What is the abbreviation for $\text{CH}_3(\text{CH}_2)_4\text{CH}=\text{CH}(\text{CH}_2)\text{CH}=\text{CH}(\text{CH}_2)_7\text{COOH}$?
 (A) 18:2 Δ 9,10,12,13 (B) 18:2 Δ 9,12
 (C) 18:2 Δ 6,7,9,10 (D) 18:2 Δ 6,9
16. Which of the following will reduce the fluidity of biomembrane?
 (A) Triacylglycerol (B) cholesterol
 (C) glycolipid (D) phospholipid
17. Na/K pump is to transport:
 (A) Na outside of the cell & K inside of the cell.
 (B) Na inside of the cell & K outside of the cell.
 (C) both Na and K outside of the cell.
 (D) both Na and K inside of the cell.
18. Ketone bodies will result in the decrease in blood acidity to:
 (A) Increase the affinity of hemoglobin to O_2
 (B) decrease the affinity of hemoglobin to O_2
 (C) average out the affinity of hemoglobin to O_2
 (D) maintain the affinity of hemoglobin to O_2
19. The main purpose of glyoxylate cycle is to generate oxaloacetate from:
 (A) succinyl CoA. (B) malonyl CoA. (C) acetyl CoA. (D) CoA.
20. How many net ATPs will be generated after one glucose molecule is oxidized completely to CO_2 and H_2O in liver?
 (A) 26 (B) 28 (C) 30 (D) 32

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21. Continuing from the above question, which shuttle mechanism is used for transport the metabolite between mitochondria and cytosol in liver?

- (A) glycerol-phosphate shuttle (B) pyruvate-oxaloacetate shuttle
(C) citrate-succinate shuttle (D) malate-aspartate shuttle

The Genetic Code

First Position	Second Position				Third Position
5' end	U	C	A	G	3' end
U	Phe	Ser	Tyr	Cys	U
	Phe	Ser	Tyr	Cys	C
	Leu	Ser	STOP	STOP	A
	Leu	Ser	SeCys; STOP	Trp	G
C	Leu	Pro	His	Arg	U
	Leu	Pro	His	Arg	C
	Leu	Pro	Gln	Arg	A
	Leu	Pro	Gln	Arg	G
A	Ile	Thr	Asn	Ser	U
	Ile	Thr	Asn	Ser	C
	Ile	Thr	Lys	Arg	A
	Met	Thr	Lys	Arg	G
G	Val	Ala	Asp	Gly	U
	Val	Ala	Asp	Gly	C
	Val	Ala	Glu	Gly	A
	Val	Ala	Glu	Gly	G

22. Kozak sequence (ACCAUGG) is the sequence involved in the identification of translational initiation site. Using the genetic code above, how many possible polypeptide chains will be produced from the nucleic acid sequence below?

5'-AUGCCAUGAUGUAGUACCAUGGGUAGGCAUGAAUGUGACUGAUUUAAGUAACA
UAAUAAA
AA-3'

- (A) 1 (B) 2 (C) 3 (D) 4

23. Continuing from the above question, which of the following is not included in any possible polypeptide chain?

- (A) Glycine (B) Cysteine (C) Valine (D) Lysine

24. What are the human intron boundaries?

- (A) 5' GU.....AG 3' (B) 5' UG.....GA 3'
(C) 5' AG.....GU 3' (D) 5' GA.....UG 3'

25. Deamination of 5-methyl cytosine leads to:

- (A) C to A transversion mutations (B) C to A transition mutations
(C) G to A transversion mutations (D) G to A transition mutations

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26. Which of the following is the precursor for purine biosynthesis?
 (A) Adenine (B) Hypoxanthine (C) Aminopterin (D) thymidine
27.

<u>enzyme</u>	k_M (mol/L)	k_{cat} (s ⁻¹)
A	1.5×10^{-2}	0.14
B	3.0×10^{-4}	0.50
C	9.0×10^{-4}	7.6
D	7.9×10^{-3}	7.9×10^2

 Which of the enzyme has higher efficiency?
 (A) A (B) B (C) C (D) D
28. Which of the following is a DNA-binding domain?
 (A) Zn-finger (B) helix-turn-helix motif
 (C) basic region-leucine zipper (D) all of the above
29. Which is responsible for DNA replication in eukaryotic mitochondria?
 (A) DNA polymerase α (B) DNA polymerase β
 (C) DNA polymerase γ (D) DNA polymerase δ
30. Which of the following are trans-acting elements?
 (A) hormone responsive elements (B) enhancers
 (C) transcription factors (D) operon
31. Which subunit in RNA polymerase holoenzyme is responsible for the binding to the sense DNA?
 (A) α (B) β (C) ρ (D) σ
32. Which are the two subunits for eukaryotic ribosome?
 (A) 30S, 50S (B) 40S, 60S (C) 30S, 70S (D) 40S, 80S
33. Which enzyme is responsible for cDNA synthesis?
 (A) reverse transcriptase (B) DNA polymerase
 (C) DNA ligase (D) all of the above
34. Which sequence is necessary for ribosome binding in prokaryote?
 (A) Kozak sequence (B) Shine-Dalgarno sequence
 (C) Signal sequence (D) Okazaki sequence
35. Which of the following may not belong to promoter region?
 (A) operater (B) enhancer (C) TATA box (D) CAT box
36. Splicing is one of the:
 (A) pre-transcriptional modification
 (B) post-transcriptional modification
 (C) pre-translational modification
 (D) post-translational modification
37. Which of the following is the key material for Sanger method to determine DNA sequence?
 (A) NTPs (B) rNTPs (C) dNTPs (D) ddNTPs

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<p>38. Which of the characteristic does not belong to eukaryotic DNA replication? (A) semi-conservative (B) semi-discontinuous (C) single origin of replication (D) 5' to 3' replication direction</p> <p>39. Which of the following has higher T_m (transition temperature)? (A) 5' GTGCCTGCG 3' (B) 5' ATATCGTAT 3' (C) 5' CAGTAGATAC 3' (D) 5' CTAGGATGC 3'</p> <p>40. The formation of 1,3-diphosphoglycerate is accompanied by the formation of NADH in the cytoplasm. What is the primary fate of this NADH under aerobic conditions? (A).It accumulates in the cytosol. (B).It diffuses into mitochondria. (C).It transfers its reducing equivalents directly to NADP+ (D).The reducing equivalents are transferred by a shuttle system to the mitochondrial electron transport system.</p> <p>41. In the Cori cycle, the liver is primarily responsible for converting lactate from muscle into a substrate which is returned to muscle. This substrate is chiefly: (A) acetyl CoA. (B) glucose. (C).alanine. (D) pyruvate.</p> <p>42. Which of the following for both DNA polymerase and RNA polymerase is NOT true? (A) Both need a template. (B) Both require a primer. (C) Both reactions produce pyrophosphate as a product. (D) Both add 5' nucleotides to 3' hydroxyl groups.</p> <p>43. What will be the effect of a single base pair deletion in the middle of a DNA sequence coding for a certain protein? (A) A protein with a single amino acid substitution in its center. (B) The gene will not be transcribed and no protein will be produced. (C) The amino half of the protein will have a normal sequence. (D) The carboxyl half of the protein will have a normal sequence.</p> <p>44. Allosteric inhibitors of enzymes most LIKELY influence enzyme activity by: (A) inducing a conformational change in the enzyme. (B) promoting a covalent modification of the enzyme. (C) binding to the active site of the enzyme. (D) reacting with the substrate.</p> <p>45. NADPH necessary for de novo biosynthesis of fatty acids can be produced directly by action of: (A) glucose 6-phosphate dehydrogenase. (B) mitochondrial malate dehydrogenase. (C) glyceraldehyde-3-phosphate dehydrogenase. (D) lactate dehydrogenase.</p>					

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46. A competitive inhibitor:
- (A) forms an irreversible complex with a site on an enzyme other than the active site.
 - (B) decreases the maximal velocity of the reaction catalyzed by an enzyme.
 - (C) competes with the substrate for the active site of an enzyme.
 - (D) lowers the K_m for the substrate.
47. Glycolysis is only partially reversible because of energy barriers at the reactions catalyzed by:
- (A) hexokinase, triose phosphate isomerase and pyruvate kinase.
 - (B) hexokinase, pyruvate dehydrogenase and phosphoenolpyruvate carboxykinase.
 - (C) hexokinase, phosphofructokinase, and pyruvate kinase.
 - (D) hexokinase, glyceraldehyde 3-phosphate dehydrogenase and pyruvate kinase.
48. Codon-anticodon interactions:
- (A) take place between mRNA and tRNA.
 - (B) involve base-pairing between mRNA and rRNA.
 - (C) refer to interactions with the three termination codons.
 - (D) involve base-pairing between tRNAs and amino acids.
49. Which of the following is true about the difference between fatty acid degradation and biosynthesis?
- (A) Fatty acid degradation is in cytosol while its biosynthesis is in mitochondria.
 - (B) Fatty acid degradation starts at carboxyl end while its biosynthesis starts at methyl end.
 - (C) The final product for fatty acid degradation is propionyl CoA while the final product for its biosynthesis is acetyl CoA.
 - (D) The malonyl-CoA is involved in the fatty acid degradation, but the malonyl-CoA is not involved in its biosynthesis.
50. Acetyl-CoA for de novo fatty acid biosynthesis is formed by the energy-dependent cleavage of:
- (A) pyruvate.
 - (B) oxaloacetate.
 - (C) citrate.
 - (D) α -ketoglutarate.