

亞洲大學

106 學年度學士後獸醫學系招生考試試題紙

學系別	考試科目	考試日期	時 間
學士後獸醫學系	生物化學		13:30-15:10

Multiple choice questions (單選題): 100%

1. Which of the following is the inhibitor for alternative purine synthesis?
(A) guanine (B) hypoxanthine (C) aminopterin (D) thymidine
2. 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
3. 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
4. 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
5. 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
6. 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
7. Which of the following is the key compound for Edman degradation method?
(A) agarose (B) polyacrylamide
(C) phenyl isothiocyanate (D) dextran

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8. Which molecule is involved in glycogen synthesis?
(A) GTP (B) CTP (C) ATP (D) UTP

9. Which of the following can NOT pass through mitochondria?
(A) Pyruvate (B) oxaloacetate (C) malate (D) citrate

10. Which reaction is mediated by GTP?
(A) pyruvate → oxaloacetate
(B) oxaloacetate → phosphoenolpyruvate
(C) acetyl CoA → pyruvate
(D) malate → oxaloacetate

11. 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

12. Which of the following is $\text{CH}_3(\text{CH}_2)_4\text{CH}=\text{CH}(\text{CH}_2)\text{CH}=\text{CH}(\text{CH}_2)_7\text{COOH}$?
(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

13. 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

14. What is the bond between nucleotides?
(A) 5' to 3' phosphodiester bond (B) 3' to 5' phosphodiester bond
(C) 5' to 2' phosphodiester bond (D) 2' to 5' phosphodiester bond

15. During DNA replication, which primer is required on one of the strand?
(A) RNA primer (B) DNA primer
(C) both DNA and RNA primers (D) none of the above

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16. 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

17. During DNA replication, Okazaki fragments are formed on the:
(A) lagging strand (B) leading strand
(C) template strand (D) coding strand

18. Which will be modulated by phosphorylation?
(A) Serine (B) Threonine
(C) Tyrosine (D) All of the above

19. Which following phosphorylation is not coupled by ATP?
(A) glucose → glucose-6-phosphate
(B) fructose-6-phosphate → fructose-1,6-bisphosphate
(C) glyceraldehydes-3-phosphate → 1,3-bisphosphoglycerate
(D) phosphoenolpyruvate → pyruvate

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

21. 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

22. What is the major product for Glyoxylate cycle?
(A) Citrate (B) succinate (C) oxaloacetate (D) pyruvate

23. The isoelectric point of alanine is 6.0. If alanine is dissolved in the pH 8.0 buffer and subjected to electrophoresis, it will:
(A) not migrate to either anode or cathode
(B) migrate to the cathode (negative pole)
(C) migrate to the anode
(D) some will migrate to the anode and some to the cathode

24. Continuing from the above question, this product is for:
(A) TCA cycle in bacteria (B) gluconeogenesis in animal
(C) TCA cycle in animal (D) gluconeogenesis in plant

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<p>25. The mutant form of prions is the causative agent of Mad Cow Disease in human. The major difference between mutant prions and the normal prions is that:</p> <p>(A) the mutant prions have a large percentage of α-helix whereas the normal prions have more β-sheets</p> <p>(B) the normal prions have a large percentage of α-helix whereas the mutant prions have more β-sheets</p> <p>(C) both the mutant prions and the normal prions have more β-sheets</p> <p>(D) both the mutant prions and the normal prions have a large percentage of α-helix</p>																			
<p>26. enzyme K_M (mol/L) k_{cat} (s^{-1})</p> <table style="width: 100%; border: none;"> <tr> <td style="width: 15%;">A</td> <td style="width: 30%; text-align: center;">1.5×10^{-2}</td> <td style="width: 15%; text-align: center;">0.14</td> <td style="width: 40%;"></td> </tr> <tr> <td>B</td> <td style="text-align: center;">3.0×10^{-4}</td> <td style="text-align: center;">0.50</td> <td></td> </tr> <tr> <td>C</td> <td style="text-align: center;">9.0×10^{-4}</td> <td style="text-align: center;">7.6</td> <td></td> </tr> <tr> <td>D</td> <td style="text-align: center;">7.9×10^{-3}</td> <td style="text-align: center;">7.9×10^2</td> <td></td> </tr> </table> <p>Which of the enzyme has higher substrate affinity?</p> <p>(A) A (B) B (C) C (D) D</p>				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	
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																	
<p>27. Gel filtration chromatography separates the molecules based on the:</p> <p>(A) specific binding (B) net charge</p> <p>(C) size exclusion (D) precipitation</p>																			
<p>28. Which of the protease is involved in ubiquitin-dependent degradation pathway?</p> <p>(A) cathepsin (B) lysosome (C) calpain (D) proteasome</p>																			
<p>29. Which is responsible for DNA replication in eukaryotic mitochondria?</p> <p>(A) DNA polymerase α (B) DNA polymerase β</p> <p>(C) DNA polymerase γ (D) DNA polymerase δ</p>																			
<p>30. Which of the following are trans-acting elements?</p> <p>(A) hormone responsive elements (B) enhancers</p> <p>(C) transcription factors (D) operon</p>																			
<p>31. Which subunit in RNA polymerase holoenzyme is responsible for the binding to the sense DNA?</p> <p>(A) α (B) β (C) ρ (D) σ</p>																			

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32. Which are the two subunits for eukaryotic ribosome?
(A) 30S, 50S (B) 40S, 60S (C) 30S, 70S (D) 40S, 80S

33. The process of long chain fatty acid oxidation in liver is regulated in part by the interaction of:
(A) acetyl-CoA with carnitine acyl transferase I
(B) acetyl-CoA with carnitine acyl transferase II
(C) malonyl-CoA with carnitine acyl transferase I
(D) malonyl-CoA with carnitine acyl transferase II

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 is not the product for pentose phosphate pathway?
(A) NADPH (B) NADH (C) CO₂ (D) sugar

36. Which of the following is not a DNA-binding domain?
(A) Zn-finger (B) Cys-finger
(C) helix-turn-helix motif (D) basic region-leucine zipper

37. Which of the following is the key material for Sanger method to determine DNA sequence?
(A) NTPs (B) rNTPs (C) dNTPs (D) ddNTPs

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

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'

40. The mRNA maturation from pre-mRNA in eukaryotes does not need to go through:
(A) splicing (B) capping (C) adenylation (D) glycosylation

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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

42. Which eukaryotic RNA polymerase is responsible for mRNA synthesis?
(A) RNA polymerase I (B) RNA polymerase II
(C) RNA polymerase III (D) RNA polymerase IV

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

44. 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

45. To purify protein rich in Lysine residues, which of the following material should be used?
(A) dextran (B) triton X-100
(C) diethylaminoethyl cellulose (D) carboxymethyl cellulose

46. Cancer cells can proliferate indefinitely because they have high:
(A) polymerase activity (B) primase activity
(C) telomerase activity (D) helicase activity

47. Which of the following fat-soluble vitamins is involved in blood clotting?
(A) vitamin A (B) vitamin D (C) vitamin E (D) vitamin K

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48. 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

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

51. The acyl donor for cholesterol ester formation in blood is:

- (A) phosphatidylcholine
- (B) palmitoyl-CoA
- (C) triglycerides
- (D) acyl carrier protein

52. Which of the following sequence is required for purification on the Nickel column?

- (A) Lys tag
- (B) His tag
- (C) Gly tag
- (D) Met tag

53. When making the antibody, which region of the synthetic peptides should be used?

- (A) Hydrocarbon region
- (B) Hydrophobic region
- (C) Hydrophilic region
- (D) Hydrolytic region

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54. What is the major difference between genomic DNA and cDNA?
(A) intron (B) exon (C) nucleotide (D) None of the above

55. The first 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

56. Which of the following is not a polysaccharide?
(A) Chitin (B) cellulose (C) pectin (D) lignin

57. Which reaction generates NADH in glycolysis?
(A) glucose \rightarrow glucose-6-phosphate
(B) fructose-6-phosphate \rightarrow fructose-1,6-bisphosphate
(C) glyceraldehydes-3-phosphate \rightarrow 1,3-bisphosphoglycerate
(D) phosphoenolpyruvate \rightarrow pyruvate

58. What is the first product during glycogen breakdown?
(A) glucose-1-phosphate (B) glucose-6-phosphate
(C) glucose (D) all of the above

59. How many net ATP is gained from glycolysis beginning with glycogen breakdown?
(A) 1 (B) 2 (C) 3 (D) 4

60. The reactions in Cori cycle are:
(A) gluconeogenesis in liver & glycolysis in muscle
(B) gluconeogenesis in muscle & glycolysis in liver
(C) gluconeogenesis in adipose tissue & glycolysis in liver
(D) gluconeogenesis in liver & glycolysis in adipose tissue

61. Ketone bodies will result in the decrease in blood acidity to:
(A) increase the affinity of hemoglobin to O₂
(B) decrease the affinity of hemoglobin to O₂
(C) average out the affinity of hemoglobin to O₂
(D) maintain the affinity of hemoglobin to O₂

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62. Which of the following is the shuttle mechanism for metabolite transport between mitochondria and cytosol during glycolysis in muscle?
(A) glycerol-phosphate shuttle
(B) pyruvate-oxaloacetate shuttle
(C) citrate-succinate shuttle
(D) malate-aspartate shuttle

63. Continuing from the above question, the purpose of the shuttle mechanism is to transport:
(A) ATP (B) NADH (C) NADPH (D) FADH₂

64. Continuing from the above question, how many net ATPs will be generated after one glucose molecule was oxidized completely to CO₂ and H₂O in muscle?
(A) 26 (B) 28 (C) 30 (D) 32

65. Generation of antibody diversity occurs in part as a result of
(A) alternative mRNA splicing (B) DNA recombination
(C) transcriptional errors (D) translational errors

66. The k_{cat}/k_M [(mol/L)⁻¹s⁻¹] of enzyme X for substrate A, B, C, and D are 0.13, 0.036, 3000 and 100, respectively. Which substrate is best for enzyme X?
(A) A (B) B (C) C (D) D

67. What is the direction for DNA and RNA synthesis, respectively?
(A) 5' to 5' and 5' to 5' (B) 5' to 3' and 5' to 3'
(C) 5' to 5' and 5' to 3' (D) 5' to 3' and 5' to 5'

68. Nucleic acids absorb ultraviolet light principally because of their aromatic base components. Which kind of nucleic acid below absorbs UV most efficiently?
(A) RNA in an A-form helix (B) RNA in a B-form helix
(C) single-stranded DNA (D) double-stranded DNA

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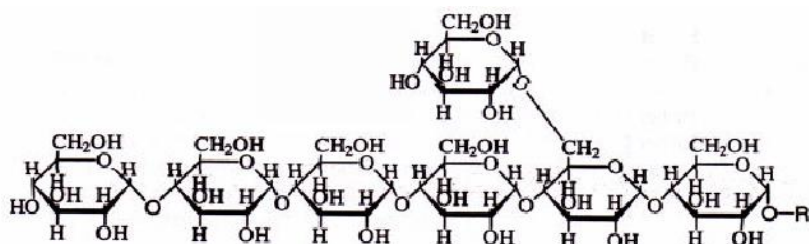
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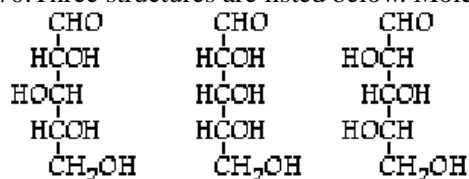
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69. The partial structure of a polysaccharide is listed below. Which of the following glycosidic linkage is NOT shown in the molecule below?

- (A) α -1,4-glycosidic linkage (B) α -1,6-glycosidic linkage
 (C) β -1,6-glycosidic linkage (D) None of the above



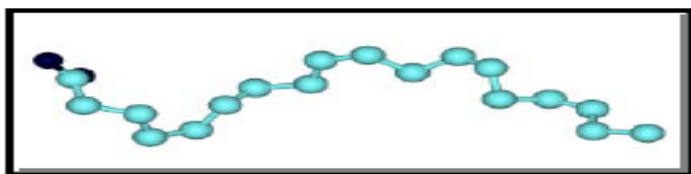
70. Three structures are listed below. Molecule A and B are:



A B C

- (A) enantiomers (B) epimers
 (C) mirror-image stereoisomers (D) none of the above

71. The figure shown below is a ball-and-stick representation of the crystal structure of a lipid (Note that the H atoms, which are often not evident in X-ray crystallography, are not shown). This lipid is:



- (A) linolenic acid (B) palmitic acid
 (C) triacylglycerol (D) phosphatidylethanolamine

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75. By adding SDS (sodium dodecyl sulfate) during the electrophoresis of proteins, it is possible to:

(A) measure an enzyme's specific activity
 (B) preserve a protein's native structure and biological activity
 (C) determine a protein's isoelectric point
 (D) separate proteins exclusively on the basis of molecular weight

76. After one hour of electrophoresis in an agarose gel at a field strength of 5 volts/cm, one DNA fragment migrated 10 cm while another DNA fragment migrated only 6 cm. From this information you can conclude:

(A) that the DNA that migrated 10 cm is larger than the DNA that migrated 6 cm
 (B) that the DNA that migrated 10 cm is smaller than the DNA that migrated 6 cm
 (C) nothing about the sizes of the DNA fragments without information about the migration of DNA size standards
 (D) that the experiment failed

77. The structures of purine and pyrimidine are shown below. The N atom at the position 1 of a purine molecule comes from:

(A) glutamine (B) glycine (C) aspartate (D) tyrosine

78. Which lines are the inhibitor lines (with inhibitors) for Plot (1) and (2) below, respectively?

(A) a, c (B) b, d (C) a, d (D) b, c

(1)

(2)

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79. Kozak sequence (ACCAUGG) is the sequence involved in the identification of translational initiation site. Using the genetic code below, how many possible polypeptide chains will be produced from the nucleic acid sequence?
 5'-AUGCCAUGAUGUAGUACCAUGGGUAGGCAUGAAUGUG
 ACUGAUUUUAGUAAUAUAAAAAAAAAAAAAAAAAAAA
 AAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAA
 AAAAAAAAAAAAAAAAAAAAAA-3'

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

80. 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

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