亞洲大學

109 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	109.5.02	13:30-15:00

1. Specialized structures with functional distinctions, organelles, exist with cells and constrain particular biological processes that confer metabolic efficiency. Which organelle is the primary sources of energy for cells of eukaryote?
   A. Endoplasmic reticulum **B**. Golgi apparatus **C**. Mitochondria **D**. Lysosomes

2. Receives writes, which enzyme is **NOT** contained in this organelle?
   A. Rubisco **B**. Fumarase **C**. Cytochrome oxidase **D**. Citrate synthase

3. Which step of polymerase chain reaction (PCR) cycle requires DNA polymerase?
   A. Denaturation **B.** Annealing **C.** Elongation **D.** Hybridization

4. Which step of polymerase chain reaction (PCR) cycle is the binding of a primer to a DNA strand?
   A. Denaturation **B.** Annealing **C.** Elongation **D.** Hybridization

5. Which method can make copies of a specific DNA sample rapidly?
   A. Edman degradation **B.** Polymerase chain reaction **C.** Ultracentrifugation **D.** X-ray crystallography

6. Which method is typically used for separation of cellular organelles?
   A. Edman degradation **B.** Polymerase chain reaction **C.** Ultracentrifugation **D.** X-ray crystallography

7. During the separation of protein molecules, which method is related to different molecular weight and configuration of proteins?
   A. Hydrophobic interaction chromatography **B.** Affinity chromatography **C.** Ion exchange **D.** Gel filtration

8. Which one of the following amino acids is polar?
   A. Phe **B**. Ser **C**. Pro **D**. Trp

9. Which one of the following amino acids does **NOT** contain aromatic hydrocarbon?
   A. Phe **B**. Met **C**. Trp **D**. Tyr

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10. Which one of the following immunoglobulins is the first antibody to appear in the response to initial exposure to an antigen?
A. IgG **B.** IgA **C.** IgM **D.** IgY

11. What kind of immunoglobulin is the major antibody in bird?
A. IgG **B.** IgA **C.** IgM **D.** IgY

12. Which of the following is **NOT** fat-soluble vitamin?
A. Vitamin A **B.** Vitamin B **C.** Vitamin D **D.** Vitamin K

13. Which of the following is related to the regulatory function in blood clotting?
A. Vitamin A **B.** Vitamin B **C.** Vitamin D **D.** Vitamin K

14. Which type of RNA is the least abundant in a cell??
A. Transfer RNA **B.** Messenger RNA **C.** 30S rRNA **D.** 50S rRNA

15. Which type of RNA is the smallest?
A. Transfer RNA **B.** Messenger RNA **C.** 30S rRNA **D.** 50S rRNA

16. Which one of the following enzymes can introduce negative supercoils into DNA in DNA replication?
A. DNA gyrase **B.** DNA primase **C.** DNA helicase **D.** DNA ligase

17. RNA serves as a primer in DNA replication. Which one of the following enzymes can catalyzes the synthesis of the RNA primer?
A. DNA gyrase **B.** DNA primase **C.** DNA helicase **D.** DNA ligase

18. Which complex in the respiratory chain can **NOT** directly enhances the electrochemical proton gradient?
A. Complex I **B.** Complex II **C.** Complex III **D.** Complex VI

19. Which complex in the respiratory chain is inhibited by cyanide (CN^-)?
A. Complex I **B.** Complex II **C.** Complex III **D.** Complex VI

20. What is the central pathway in nitrogen metabolism?
A. Citric acid cycle **B.** Calvin cycle **C.** Cori cycle **D.** Urea cycle

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21. What is the second messenger system for the insulin response?
A. Cyclic AMP **B.** Calcium ion (Ca^{2+}) **C.** G protein **D.** Receptor Tyrosine Kinases

22. Which amino acids have negative charge at pH 7.4?
A. Phe, Tyr, Trp **B**. Ser, Asn, Gln **C**. Lys, Arg **D**. Asp, Glu

23. Which of the following are **NOT** glucogenic amino acid?
A. Leu, Lys **B.** Ala, Gly **C.** Ser, Thr **D.** Cys, Glu

24. What force **NOT** drives the formation of protein tertiary structure?
A. Van der Waals force **B.** Electrostatic interaction **C.** H-bonds **D.** Ionic bonds

25. The buffers that have wide use are zwitterions. Which of the following substances **NOT** have zwitterionic form?
A. Potassium chloride (KCl) **B.** N-*tris*[hydroxymethyl]methyl-2-aminoethane sulfonate (TES) **C.** N-2-hydroxyethylpiperazine-N'-2-ethane sulfonate (HEPES) **D.** 3-[N-morpholino]propane-sulfonic acid (MOPS)

26. Sickle-cell disease (SCD) is a group of blood disorders typically inherited from parents. Which of the following single amino acid substitution in the β-chains of hemoglobin result SCD?
A. Gly→Ala **B.** Leu→Ile **C.** Glu→Val **D.** Arg→Lys

27. Which one of the following ions plays a key role in extracting electrons from NADH to ubiquinone (UQ) in the respiratory complexes?
A. Calcium **B.** Natrium **C.** Manganese **D.** Iron

28. In the living organism, adenosine triphosphate (ATP) functions as the most important energy intermediate. Which one of the following processes produces the most ATP?
A. Fermentation **B.** Glycolysis **C.** Tricarboxylic acid cycle **D.** Oxidative phosphorylation

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29. Which one of the following aqueous solutions has the highest pH? The solutions have H^+ concentration respectively of
A. 1.3×10^{-4} mol/L **B**. 4.2×10^{-3} mol/L **C**. 2.1×10^{-10} mol/L **D**. 3.5×10^{-6} mol/L

30. Formic acid (HCOOH) has a pKa of 3.744 What is the molar ratio of potassium formate (HCOOK) to formic acid at pH 3.744?
A. 10:1 **B**. 1:10 **C**. 21 **D**. 1:1

31. *O*-linked glycosylation is important in many diseases including cancer, diabetes and Alzheimer's. Which amino acids play a key role in this process? (*O*-glycans are attached to the oxygen atom of these amino acids)
A. Asn, Asp **B.** Gly, Ala **C**. Lys, Arg **D**. Ser, Thr

32. Which of the following is a standard start codon for protein synthesis in eukaryotes?
A. AUG **B.** UAG **C.** UGA **D.** UAA

33. Which one of the following forces can maintain the quaternary structure of a protein?
A. Electrostatic interaction **B.** Van der Waals force **C.** H-bonds **D.** All of the above

34. Which nucleosides below contain purines?
A. A, G **B.** C, T, U **C.** C, G **D.** A, G, U

35. Which one of the following organelles does **NOT** contain DNA?
A. Nucleus B. Chloroplast C. Lysosome D. Mitochondria

36. Which organelles are surrounded by a double membrane?
A. Nucleus **B.** Chloroplast **C.** Mitochondria **D.** All of the above

37. Which one of the following diseases is **NOT** caused by misfolded protein?
A. Sickle-cell disease **B.** Creutzfeldt-Jakob disease **C.** Alzheimer's disease **D.** Parkinson's disease

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38. Which description is **NOT** correct?
A. RNA is initially synthesized using a DNA template in transcription. **B.** Both DNA template and primer are required in RNA synthesis. **C.** The enzyme that catalyzes the RNA synthesis is DNA-dependent RNA polymerase. **D.** The enzyme uses one strand of the DNA as the template for RNA synthesis.

39. In prokaryotes, transcription is controlled in four principal ways. Which of the following can control the production of β-galactosidase in *E. coli*?
A. Alternative σ factors **B.** Enhancers **C.** Operons **D.** Transcription attenuation

40. Which of the following enzymes is **NOT** required in forming recombinant DNA?
A. Restriction endonucleases **B.** DNA ligase **C.** Taq DNA polymerase **D.** DNA gyrase

41. Which of the following is contained in the promoter of the eukaryotes?
A. GC box **B.** TATA box **C.** Initiator element **D.** All of the above

42. Which description is **NOT** correct?
A. DNA synthesis is bidirectional. **B.** The direction of DNA synthesis is from the 3' end to the 5' end of the newly formed strand. **C.** The leading strand is formed continuously, while the lagging strand is formed discontinuously. **D.** On the lagging strand, Okazaki fragments are subsequently linked by ligase.

43. Five DNA polymerases have been found in *E. coli*. Which of the following is primarily responsible for the synthesis of new strands in DNA replication?
A. Polymerases I **B.** Polymerase II **C.** Polymerase III **D.** Polymerase IV and V

44. Five DNA polymerases have been found in eukaryotes. Which of the following is primarily responsible for the synthesis of new strands in DNA replication??
A. Polymerases α **B.** Polymerase β **C.** Polymerase γ **D.** Polymerase δ and ε

45. Which one of the following molecules is the key regulator of membrane fluidity?
A. Glycolipids **B.** Glycoprotein **C.** Peripheral membrane proteins **D.** Cholesterol

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46. Which one of the following mechanisms can regenerates NADH inside the mitochondrial matrix?
A. Malate-aspartate shuttle **B.** Glycerol phosphate shuttle **C.** Mitochondrial shuttle **D.** All of the above

47. Which one of the following molecules is **NOT** the second messenger in the phosphoinositol signaling pathway?
A. Calcium ions (Ca^{2+}) **B.** Inositol 1,4,5-trisphosphate (IP_3) **C.** Diacylglycerol (DAG) **D.** Hydroxytryptamine (5-HT)

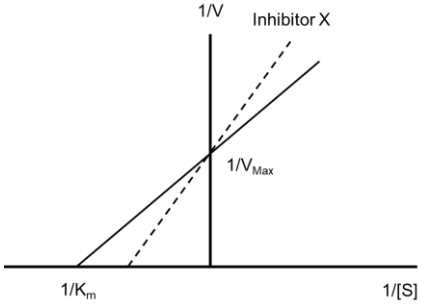
48. What is the major product in pentose phosphate pathway (PPP)?
A. ATP **B.** NADH **C.** NADPH **D.** $FADH_2$

49. Which type of DNA is the principal form that occurs in nature?
A. A-DNA **B.** B-DNA **C.** Z-DNA **D.** None of above

50. Which of the following provides the energy to drive many processes in cells?
A. ATP **B.** NADH **C.** NADPH **D.** $FADH_2$

51. What is the net gain of ATP production in the lactic acid fermentation?
A. 30 **B.** 8 **C.** 4 **D.** 2

52. What type of inhibitor X is this Lineweaver–Burk plot shown?



A. Competitive inhibition **B.** Uncompetitive inhibition **C.** Noncompetitive inhibition **D.** Irreversible inhibitors

53. The value of V_{max} decreases, but that of K_m remains the same. What kind of inhibition does this description represent?
A. Competitive inhibition **B.** Uncompetitive inhibition **C.** Noncompetitive inhibition **D.** Irreversible inhibitors

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54. A Lineweaver–Burk plot shows parallel lines. What kind of inhibition does this description represent?
A. Competitive inhibition **B.** Uncompetitive inhibition **C.** Noncompetitive inhibition **D.** Irreversible inhibitors

55. Which of the following is a nonessential amino acid in human nutrition?
A. Phenylalanine **B.** Arginine **C.** Methionine **D.** Tryptophan

56. Fetal hemoglobin has a higher affinity for oxygen. What is the critical amino acid difference between the β-chain (adult) and the γ-chain (fetal) of hemoglobin?
A. β-chain:His^{143} γ-chain:Ser^{143} **B.** β-chain:Gly^{143} γ-chain:Ala^{143} **C.** β-chain:Leu^{143} γ-chain:Ile^{143} **D.** β-chain:Arg^{143} γ-chain:Lys^{143}

57. During the protein separation, which method relates to antibody specificity?
A. Immunoprecipitation **B.** SDS-PAGE **C.** Ion exchange **D.** Gel filtration

58. Which of the following is **NOT** included in the central dogma of molecular biology?
A. DNA **B.** RNA **C.** Protein **D.** Lipid

59. Which of the following is a key metabolite derived from glucose, fatty acid, and amino acid catabolism?
A. Pyruvate **B.** Ethanol **C.** Glucose **D.** Acetyl CoA

60. What is the main place for the oxidative phosphorylation in cells?
A. Golgi apparatus **B.** Endoplasmic reticulum **C.** Mitochondria **D.** Peroxisome

61. Which one of the following coenzymes is involved in a wide range of metabolic processes primarily related to the utilization of fats, carbohydrates, and amino acids?
A. Folic acid **B.** Biotin **C.** Flavin adenine dinucleotide **D.** Pyridoxal phosphate

62. Which one of the following coenzymes is essential for the body to make DNA and RNA and metabolize amino acids?
A. Folic acid **B.** Biotin **C.** Flavin adenine dinucleotide **D.** Pyridoxal phosphate

63. Microtubules make up the internal structure of cilia and flagella. What is the structural type of the microtubules?
A. 8+1 array **B.** 8+2 array **C.** 9+1 array **D.** 9+2 array

64. Which one of the following descriptions about membrane is correct?
A. A membrane consists of a layer of proteins sandwiched between two layers of lipids. **B.** All membrane proteins are bound to the interior of the membrane. **C.** Lipid bilayers are an important component of membranes. **D.** The compositions of the inner and outer lipid layers are the same in any individual membrane.

65. In eukaryotes, which of the following is the most common mechanism for targeting protein for destruction in a proteasome?
A. Ubiquitylation **B.** Glycosylation **C.** Methylation **D.** Phosphorylation

66. What is the major components of bacterial cell walls?
A. Homopolysaccharide **B.** Peptidoglycan **C.** Cellulose **D.** Glycosaminoglycans

67. What is the major components of plant cell walls?
A. Homopolysaccharide **B.** Peptidoglycan **C.** Cellulose **D.** Glycosaminoglycans

68. What is the starting material for steroid biosynthesis?
A. NADH **B.** NADPH **C.** Acetyl-CoA **D.** $FADH_2$

69. Which of the following is the key controlling enzyme during the synthesis of cholesterol?
A. HMG-CoA synthase **B.** HMG-CoA reductase **C.** HMG-CoA lyase **D.** None of the above

70. Which one of the following enzymes does **NOT** catalyze the control point in the glycolytic pathway?
A. Hexokinase **B.** Phosphofructokinase **C.** Pyruvate kinase **D.** Aldolase

71. Which of the following is **NOT** generated in fatty acid oxidation?
A. NADH **B.** NADPH **C.** Acetyl-CoA **D.** $FADH_2$

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72. Which organelle in liver cells is the principal site of ketone body synthesis?
A. Endoplasmic reticulum **B**. Golgi apparatus **C**. Mitochondria **D**. Lysosomes

73. Cholesterol is converted to other steroid hormones. Which one of the following hormones is **NOT** derived from cholesterol?
A. Progesterone **B.** Glucocorticoids **C.** Mineralocorticoids **D.** Prostaglandin

74. Which of the following can **NOT** regulate the metabolism of glycogen?
A. Insulin **B.** Epinephrine **C.** Glucagon **D.** Calcitonin

75. Which of the following plays a key role in controlling cholesterol metabolism?
A. VLDL receptor **B.** LDL receptor **C.** IDL receptor **D.** HDL receptor

76. Which description for photosynthesis is **NOT** correct?
A. The site of photosynthesis in eukaryotes such as green plants and green algae is the chloroplast. **B.** In the dark reactions, water is oxidized to produce oxygen, accompanied by the reduction of NAD^+ to NADP. **C.** The overall reaction pathway of sugar production is cyclic and is called the Calvin cycle. **D.** C4 plants grow more quickly than C3 plants.

77. Which of the following can be converted to glucose by gluconeogenesis?
A. Fatty acid **B.** Glycerol **C.** Glycogen **D.** Ribonucleic acid

78. What are ribozymes made of?
A. Lipid **B.** Carbohydrate **C.** Ribonucleic acid **D.** Protein

79. SARS-CoV-2 is a positive-sense single-stranded RNA virus. Which of the following components does **NOT** appear in virus particles in theory?
A. Adenine **B.** Guanine **C.** Cytosine **D.** Thymine

80. Receives writes, which of the following methods is most likely to be used for the clinical diagnosis of RNA virus?
A. Real-time reverse transcription polymerase chain reaction (rRT-PCR) **B.** Polymerase chain reaction (PCR) **C.** Restriction fragment length polymorphism, (RFLP) **D.** Random amplification of polymorphic DNA (RAPD)

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