

國 立 宜 蘭 大 學

114 學年度碩士班考試入學招生

生化與生理試題

(生物技術與動物科學系碩士班)

准考證號碼：

《作答注意事項》

1. 請先檢查准考證號碼、座位號碼及答案卷號碼是否相符。
2. 考試時間：100 分鐘。
3. 本試卷共有 50 題選擇題，一題 2 分，共計 100 分。
4. 請將答案寫在答案卷上。
5. 考試中禁止使用手機或其他通信設備。
6. 考試後，請將試題卷及答案卷一併繳交。
7. 本試卷採雙面影印，請勿漏答。
8. 應試時不得使用電子計算機。

單一選擇題，每題 2 分，共 50 題。

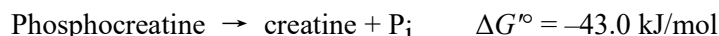
1. Which would be best to separate a protein that binds strongly to its substrate?
(A) Gel filtration (B) Cation or anion exchange (C) Cation exchange (D) Anion exchange (E) Affinity chromatography.
2. In allosteric interactions
(A) proteins that consist of a single polypeptide chain form aggregates.
(B) disulfide bonds are broken.
(C) metal ions always bind to the protein.
(D) changes that take place in one site of a protein cause drastic changes at a distant site.
3. The oxidative reactions of the pentose phosphate pathway
(A) require biotin (B) produce NADPH rather than NADH
(C) require coenzyme A (D) require thiamine pyrophosphate.
4. Why is the peptide bond planar?
(A) Bulky side chains prevent free rotation around the bond.
(B) It contains partial double-bond character, preventing rotation.
(C) Hydrogen bonding between the NH and C=O groups limits movement.
5. An Okazaki fragment is a:
(A) segment of DNA that is an intermediate in the synthesis of the lagging strand.
(B) fragment of RNA that is a subunit of the 30S ribosome.
(C) fragment of DNA resulting from endonuclease action.
(D) piece of DNA that is synthesized in the 3'→5' direction.
6. What factor(s) influence(s) the binding of oxygen to myoglobin?
(A) The concentration of bicarbonate ion, HCO_3^- (B) The partial pressure of oxygen, $p\text{O}_2$
(C) The concentration of hemoglobin present (D) The concentration of 2,3-BPG.
7. Which of the following amino acids is unlikely to be found in an α -helix due to its cyclic structure? (A) proline (B) tryptophan (C) phenylalanine (D) lysine.
8. Which of the following inhibitors binds to the enzyme at a site other than the active site?
(A) noncompetitive inhibitor (B) competitive inhibitor (C) irreversible inhibitor (D) all of the above (E) none of the above.
9. Which of the following modifications is likely to happen to the mRNA in a eukaryotic cell?
(A) removal of intervening sequences (introns) (B) addition of a poly-A tail to the 3' end

- (C) capping of the 5' end (D) All of the above occur in eukaryotic cells.

10. Two-dimensional electrophoresis is a combination of what two techniques?

- (A) isoelectric focusing and affinity chromatography (B) isoelectric focusing and SDS-PAGE
(C) ion-exchange chromatography and SDS-PAGE (D) affinity chromatography and SDS-PAGE
(E) isoelectric focusing and ion-exchange chromatography.

11. The standard free-energy changes for the reactions below are given.



What is the overall $\Delta G'^{\circ}$ for the following reaction?



- (A) -73.5 kJ/mol (B) -12.5 kJ/mol (C) +12.5 kJ/mol (D) +73.5 kJ/mol (E) $\Delta G'^{\circ}$ cannot be calculated without K_{eq} .

12. Which of the following enzymes does not use NAD^+ for oxidation?

- (A) α -Ketoglutarate Dehydrogenase complex (B) Isocitrate Dehydrogenase (C) Succinate Dehydrogenase (D) Malate Dehydrogenase (E) All of these enzymes use NAD^+ .

13. Which of the following cannot cross the inner mitochondrial membrane?

- (A) malate (B) phosphoenolpyruvate (C) succinyl-CoA (D) oxaloacetate.

14. Which of the following is a mechanism by which enzyme catalytic activity is controlled?

- (A) Allosteric control (B) Feedback inhibition (C) Covalent modification (D) A and C
(E) A, B, and C.

15. The reactions of glycolysis occur in this eukaryotic cell compartment

- (A) Mitochondrion (B) Nucleus (C) Cytoplasm (D) Both cytoplasm and mitochondria
(E) Glycolysis occurs in all these cell compartments.

16. The genetic code is said to be degenerate. This means that

- (A) each codon codes for more than one amino acid
(B) many of the amino acids are coded for by different codons
(C) the code is universally used by virtually all species
(D) each anticodon can interact with many different triplet sequences in the mRNA, which may differ in any or all of the three nucleotide.

17. High concentrations of fructose-2,6-bisphosphate

- (A) stimulate glycolysis and inhibit gluconeogenesis.

(B) inhibit glycolysis and stimulate gluconeogenesis.

(C) stimulate both glycolysis and gluconeogenesis.

(D) inhibit both glycolysis and gluconeogenesis.

18. Which of the following monosaccharides is a ketose?

(A) glucose (B) galactose (C) fructose (D) mannose.

19. The degree of membrane fluidity depends on

(A) the percentage of lipids that contain choline

(B) the percentage of glycolipids

(C) the percentage of fatty acids

(D) the percentage of unsaturated fatty acids.

20. The promoter site is

(A) the start site for transcription in DNA

(B) the binding site for regulatory proteins that stimulate transcription

(C) the general region of DNA downstream from the start site

(D) the site on DNA at which RNA polymerase binds to initiate transcription.

21. Which piece of DNA will have the higher T_m (if both are heated under the same experimental conditions)?

(A) 30% cytosine plus guanine will have the higher T_m .

(B) 50% cytosine plus guanine will have the higher T_m .

(C) Their T_m 's will be the same.

(D) There's no way to predict for this information.

22. Which of the following is not a part of the electron transport chain

(A) NADH (B) FADH₂ (C) coenzyme Q (D) coenzyme A.

23. All of the following sugar rearrangements are part of the pentose phosphate pathway, except

(A) $C_5 + C_5 \rightarrow C_7 + C_3$

(B) $C_5 + C_5 \rightarrow C_6 + C_4$

(C) $C_7 + C_3 \rightarrow C_6 + C_4$

(D) $C_5 + C_4 \rightarrow C_6 + C_3$.

24. Which of the following lipids is not found in biological membranes?

(A) phosphoacylglycerols (B) triacylglycerols (C) glycolipids (D) cholesterol.

25. The PCR reaction mixture does not include

(A) DNA containing the sequence to be amplified. (B) DNA ligase.

(C) heat-stable DNA polymerase.

(D) oligonucleotide primer(s).

26. For a theory to be scientific and accepted, it must be based on?

(A) blind faith

(B) a single hypothesis

(C) reproducible data

(D) the word of a professional scientist.

- 27. The majority of water within the body is found in the**
(A) intracellular compartment (B) extracellular compartment
(C) blood plasma (D) interstitial fluid.
- 28. Which organ system is primarily involved in protection and thermoregulation?**
(A) the nervous system (B) the digestive system
(C) the immune system (D) the integumentary system.
- 29. Tendons (muscle to bone) and ligaments (bone to bone) are examples of**
(A) dense irregular connective tissue (B) dense regular connective tissue
(C) loose connective tissue (D) cartilage.
- 30. An isotonic solution of NaCl (molecular weight = 58.5 g) would contain**
(A) 0.9 g NaCl per liter (B) 1.8 g NaCl per liter
(C) 9 g NaCl per liter (D) 18 g NaCl per liter.
- 31. This structure runs the length of the sarcomere through the thick filaments and contributes to the elastic recoil in muscle:** (A) Z line (B) titin (C) M line (D) actin.
- 32. Type I skeletal muscle fibers:**
(A) contract rapidly. (B) have a large diameter.
(C) have a low myoglobin concentration. (D) have numerous mitochondria.
- 33. Which of the following would be found in plasma but not in serum?**
(A) amino acids (B) vitamins (C) glucose (D) fibrinogen.
- 34. The major plasma protein is:** (A) albumin (B) fibrinogen (C) alpha globulin (D) beta globulin.
- 35. Impaired motor coordination in Parkinson's disease is often due to**
(A) degeneration of the red nucleus
(B) degeneration of the substantia nigra
(C) lack of regulation of the cerebral peduncles
(D) degeneration of the mesolimbic system.
- 36. The majority of circulating lymphocytes are:**
(A) helper T lymphocytes (B) B lymphocytes
(C) cytotoxic T lymphocytes (D) suppressor T lymphocytes.
- 37. Phagocytic cells include all of the following except**
(A) microglia (B) kupffer cells (C) basophiles (D) macrophages.
- 38. A 70 kg man would have ____ grams of blood :** (A) 5600 (B) 4600 (C) 3600 (D) 6600.

39. The highest oxygen affinity is demonstrated by (A) hemoglobin A (B) hemoglobin F (C) myoglobin (D) hemoglobin S.
40. Urine is transported to the urinary bladder by the (A) ureter (B) urethra (C) nephron (D) renal pelvis.
41. Which hormones can promote the contraction of mammary myoepithelial cells and promote milk secretion?
(A) oxytocin (B) follicle-stimulating hormone (C) thyroxine (D) epinephrine.
42. Which organs are regulated by parathyroid hormone for modulation of calcium homeostasis?
(A) gut and liver (B) kidney and bone (C) liver and kidney (D) bone and liver.
43. Parathyroid gland of pig is located in:
(A) thyroid (B) thymus (C) carotid artery (D) first rib.
44. What is the average gestation period for dairy cows?
(A) 60 days (B) 113 days (C) 283 days (D) 336 days.
45. Which organs is the place where male sperm matures?
(A) testis (B) epididymis (C) seminal vesicle (D) prostate.
46. What is the correct order of the female reproductive tract of poultry from the ovary?
(A) oviduct→magnum→shell gland→isthmus→vagina
(B) oviduct→magnum→isthmus→shell gland→vagina
(C) oviduct→isthmus→magnum→shell gland→vagina
(D) oviduct→isthmus→shell gland→magnum→vagina.
47. Which nutrients enter the lymphatic system first and then enter the blood circulation system after being absorbed in the small intestine?
(A) glucose (B) amino acid (C) lipid (D) water.
48. Which functions can not be performed in the rumen of ruminants?
(A) secretion of pepsin (B) digestion of carbohydrate
(C) digestion of lipid (D) digestion of protein.
49. What is the correct order of the digestive organs after the esophagus of poultry?
(A) gizzard→crop→proventriculus (B) proventriculus→gizzard→crop
(C) proventriculus→crop→gizzard (D) crop→proventriculus→gizzard.
50. What is the correct order of the digestive organs after the esophagus of ruminants?
(A) rumen→reticulum→omasum→abomasum (B) abomasum→omasum→reticulum→rumen
(C) rumen→omasum→reticulum→abomasum (D) abomasum→rumen→reticulum→omasum.