

生理考科

非選擇題：(20%)

1. 何謂 Ketosis，試說明高產量乳牛於泌乳高峰期若營養補充不均衡易發生何種後果及其補救之策略？10%
2. 試繪表說明以下雌性動物：馬、牛、山羊、豬、與犬等家畜性成熟平均約為幾個月？動情週期間間平均幾日？發情期平均幾日或幾小時？10%

選擇題：(30%)

1. Which of the following is found primarily within the hypodermal layer of the skin?
A) Hair cells. B) Nervous tissue. C) Blood vessels. D) Adipose tissue. E) Sweat gland.
2. During muscle contraction, Ca^{2+} binds to
A) myosin. B) troponin. C) tropomyosin. D) actin. E) G actin.
3. All blood vessels are lined with
A) smooth muscle. B) skeletal muscle. C) the tunica externa. D) elastin. E) endothelial cells.
4. Immunological competence develops
A) shortly after birth. B) at birth. C) at the onset of puberty. D) during gestation. E) in adult.
5. The primary function of the large intestine is
A) mineral absorption. B) hormone degradation. C) water reabsorption. D) degrading toxins. E) hormone production.
6. Protection against atherosclerosis is believed to be associated with an
A) elevated total cholesterol. B) elevated HDL-cholesterol. C) elevated LDL-cholesterol.
D) elevated VLDL-cholesterol. E) elevated total lipids.
7. Nerves and ganglia comprise the
A) brain. B) spinal cord. C) central nervous system. D) peripheral nervous system. E) thalamus.
8. During an action potential
A) Na^{+} efflux causes depolarization. B) K^{+} influx causes repolarization. C) Na^{+} influx causes depolarization. D) K^{+} influx causes after-hyperpolarization. E) none of the above.
9. Adrenocorticotropin would be synthesized in
A) the pars intermedia. B) the pars distalis. C) the pars tuberalis. D) the neurohypophysis. E) the adrenal gland.
10. The metabolic regulation of blood pH occurs in
A) the kidneys. B) the liver. C) the lungs. D) the skin. E) all organs.

生化考科

選擇題：(50%)

11. The pKa values of lysine are 2.18 for α -carboxylic group, 8.95 for α -amino group, and 10.53 for amino acid side chain. What is the charge on lysine at pH 6.3? (A) -1 (B) 0 (C) +1 (D) +2
12. Which _____ amino acid is not optically active in the 20 standard amino acids. The reason is that its side chain _____.
- (A) alanine; is a simple methyl group
 - (B) glycine; is unbranched
 - (C) glycine; is a hydrogen atom
 - (D) lysine; contains only nitrogen
 - (E) proline; forms a covalent bond with the amino group
13. Amino acids are ampholytes because they can function as either a(n):
- (A) standard or a nonstandard monomer in proteins.
 - (B) neutral molecule or an ion.
 - (C) polar or a nonpolar molecule.
 - (D) acid or a base.
 - (E) transparent or a light-absorbing compound.
14. Which of the following statements is *false*?
- (A) Gly residues are particularly abundant in collagen.
 - (B) Collagen is a protein in which the polypeptides are mainly in the α -helix conformation.
 - (C) Disulfide linkages are important for keratin structure.
 - (D) Silk fibroin is a protein in which the polypeptide is almost entirely in the β conformation.
 - (E) α -keratin is a protein in which the polypeptides are mainly in the α -helix conformation.
15. Which of the following is *least* likely to result in protein denaturation?
- (A) Changing pH
 - (B) Boiling
 - (C) Changing the salt concentration
 - (D) Organic solvents
 - (E) Detergents
16. Enzymes are potent catalysts because they:
- (A) are consumed in the reactions.
 - (B) can prevent the conversion of products back to substrates.
 - (C) ensure that the product is more stable than the substrate.
 - (D) increase the equilibrium constants for the reactions.
 - (E) lower the activation energy for the reactions.
17. In competitive inhibition, an inhibitor:
- (A) binds at different sites on an enzyme.
 - (B) binds reversibly at the active site.
 - (C) binds *only* to the ES complex.
 - (D) binds covalently to the enzyme.
 - (E) lowers the V_{\max} of the enzyme.

18. The binding of oxygen to hemoglobin differs from the oxygen-binding behavior of myoglobin because
- (A) oxygen binding to myoglobin is cooperative.
 - (B) hemoglobin is not an allosteric protein.
 - (C) oxygen binding to hemoglobin is cooperative.
 - (D) the oxygen-binding curve of hemoglobin is hyperbolic.
 - (E) the oxygen-binding curve of myoglobin is sigmoidal.
19. What is the specificity constant of an enzyme: (A) K_m (B) V_{max} (C) K_{cat} (D) K_{cat}/K_m (E) K_d
20. Which of the following compounds is not present in the membrane phospholipids: (A) serine (B) glycine (C) inositol (D) choline (E) ethanolamine
21. Double-stranded regions of RNA:
- A) are less stable than double-stranded regions of DNA.
 - B) can form between two self-complementary regions of the same single strand of RNA.
 - C) do not occur.
 - D) can be observed in the laboratory, but probably have no biological relevance.
 - E) have the two strands arranged in parallel (unlike those of DNA, which are antiparallel).
22. Which of these statements about cholesterol synthesis is true?
- A) Cholesterol is the only known natural product whose biosynthesis involves isoprene units.
 - B) The condensation of two five-carbon units to yield geranyl pyrophosphate occurs in a "head-to-head" fashion.
 - C) Only half of the carbon atoms of cholesterol are derived from acetate.
 - D) Squalene synthesis from farnesyl pyrophosphate results in the release of two moles of PP_i for each mole of squalene formed.
 - E) The activated intermediates in the pathway are CDP-derivatives.
23. In DNA sequencing by the Sanger (dideoxy) method:
- A) specific enzymes are used to cut the newly synthesized DNA into small pieces, which are then separated by electrophoresis.
 - B) radioactive dideoxy ATP is included in each of four reaction mixtures before enzymatic synthesis of complementary strands.
 - C) the role of the dideoxy CTP is to occasionally terminate enzymatic synthesis of DNA where Gs occur in the template strands.
 - D) the dideoxynucleotides must be present at high levels to obtain long stretches of DNA sequence.
 - E) the template DNA strand is radioactive.
24. If electron transfer in tightly coupled mitochondria is blocked (with antimycin A) between cytochrome *b* and cytochrome c_1 , then:
- A) ATP synthesis will continue, but the P/O ratio will drop to one.
 - B) all ATP synthesis will stop.
 - C) electron transfer from NADH will cease, but O_2 uptake will continue.
 - D) electron transfer from succinate to O_2 will continue unabated.
 - E) energy diverted from the cytochromes will be used to make ATP, and the P/O ratio will rise.

25. The fluidity of the lipid side chains in the interior of a bilayer is generally increased by:
- A) a decrease in temperature.
 - B) an increase in the percentage of phosphatidyl ethanolamine
 - C) an increase in fatty acyl chain length.
 - D) an increase in the number of double bonds in fatty acids.
 - E) the binding of water to the fatty acyl side chains.
26. Which of the following molecules or substances contain, or are derived from, fatty acids?
- A) Sphingolipids
 - B) Beeswax
 - C) Prostaglandins
 - D) Triacylglycerols
 - E) All of the above contain or are derived from fatty acids.
27. All of the oxidative steps of the citric acid cycle are linked to the reduction of NAD^+ *except* the reaction catalyzed by:
- A) the α -ketoglutarate dehydrogenase complex.
 - B) isocitrate dehydrogenase.
 - C) malate dehydrogenase.
 - D) pyruvate dehydrogenase
 - E) succinate dehydrogenase.
28. Which combination of cofactors is involved in the conversion of pyruvate to acetyl-CoA?
- A) Biotin, FAD, and TPP
 - B) TPP, lipoic acid, and NAD^+
 - C) Biotin, NAD^+ , and FAD
 - D) NAD^+ , biotin, and TPP
 - E) Pyridoxal phosphate, FAD, and lipoic acid
29. Which of the following is *not* true of all naturally occurring DNA?
- A) Deoxyribose units are connected by 3',5'-phosphodiester bonds.
 - B) Two hydrogen bonds form between A and T.
 - C) The ratio A+T/G+C is constant for all natural DNAs.
 - D) The amount of A always equals the amount of T.
 - E) The two complementary strands are antiparallel.
30. Malonate is a competitive inhibitor of succinate dehydrogenase. If malonate is added to a mitochondrial preparation that is oxidizing pyruvate as a substrate, which of the following compounds would you expect to decrease in concentration?
- A) Citrate
 - B) Fumarate
 - C) Isocitrate
 - D) Pyruvate
 - E) Succinate