

※ 考生請注意：本試題不可使用計算機。 請於答案卷(卡)作答，於本試題紙上作答者，不予計分。
選擇題：(50 分，每題 2 分)

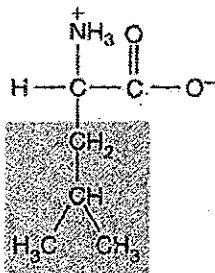
1. Please indicate the amino acids with hydroxyl group in the side chain:

- (a) G, A and V
- (b) Y, W and F
- (c) K, R, and H
- (d) S, T, and Y

2. Please indicate the amino acids bear a positive charge at physiological pH:

- (a) G, A and V
- (b) Y, W and F
- (c) K, R, and H
- (d) S, T, and Y

3. What is the name of this amino acid?



- (a) Met
- (b) **Leu**
- (c) Val
- (d) Cys

4. Sickle-cell anemia results from a single amino acid substitution in the β -chain of hemoglobin, which of the following is correct?

- (a) Glu to Val
- (b) Val to Glu
- (c) Gln to Val
- (d) Val to Gln

5. Which of the following interactions do not stabilize tertiary structure?

- (a) Hydrophilic interactions
- (b) Electrostatic interactions
- (c) Hydrogen bonds
- (d) Covalent bonds

6. The first step of the Calvin cycle involves the addition of CO₂ to _____ to produce two molecules of 3-phosphoglycerate.

- (a) Transaldolase
- (b) NADPH
- (c) Sucrose
- (d) Ribulose-1,5-bisphosphate

7. The oxidative phase of the pentose phosphate pathway produces _____, which is required for lipid biosynthesis.
 - (a) NADPH
 - (b) Carbamate
 - (c) ATP
 - (d) Glucose
8. _____ The reduced form of this molecule is critical to reducing reactive oxygen species (ROS).
 - (a) Transketolase
 - (b) Glutathione
 - (c) Transaldolase
 - (d) Phosphoglycolate
9. Which of the following statements is true?
 - (a) A conjugated protein consists of a simple protein mixed with a holoprotein.
 - (b) Ligand-induced conformational change in such proteins are called allosteric transitions
 - (c) The process of protein structure disruption is called renaturation
 - (d) Adult hemoglobin's function is to transport oxygen, which is commonly designated $\alpha_2\delta_2$
10. Which of the following classes of enzymes catalyze reactions involving the cleavage of bonds by the addition of water?
 - (a) Transferase
 - (b) Hydrolase
 - (c) Lyase
 - (d) Ligase
 - (e) Isomerase
11. Glycoconjugates result from the covalent linkage of carbohydrate to proteins or _____.
 - (a) Amino acids
 - (b) Lipids
 - (c) Nucleotides
 - (d) Both A and B are correct
 - (e) None of the above are correct
12. Glucose-6-phosphate is a substrate in which of the following processes?
 - (a) Gluconeogenesis
 - (b) Glycolysis
 - (c) Photosynthesis
 - (d) Glycogenolysis
 - (e) Both A and B are correct
13. One of the mechanisms by which vitamin C protects membrane is by
 - (a) Regenerating reduced α -tocopherol
 - (b) Reacting with proline
 - (c) Reacting with peroxyl radicals
 - (d) Both A and B are correct
 - (e) Both A and C are correct

14. Place the following reaction intermediates of the citric acid cycle in chronological order. i. malate, ii fumarate, iii succinylCoA, iv citrate, v α -ketoglutarate.

- (a), i, ii, iv, v, iii
- (b) iv, v, iii, i, ii
- (c) iv, i, v, iii, ii
- (d) v, iii, i, ii, iv
- (e) iv, v, iii, ii, i

15. The redox reaction in which succinate is converted to fumarate uses FAD rather than NAD^+ because

- (a) FAD is a stronger oxidizing agent than NAD^+
- (b) NAD^+ is a stronger oxidizing agent than FAD
- (c) FAD is required for the oxidation of carboxylic acids
- (d) Only FAD can penetrate into mitochondria
- (e) NAD is not found in the cytoplasm.

16. A respiratory burst is initiated when NADPH reacts with oxygen to produce which of the following?

- (a) Superoxide anion
- (b) Water
- (c) Hydrogen peroxide
- (d) Hydroxyl radical
- (e) Peroxide radical

17. Which of the following statements is not true?

- (a) Membrane potential is an electrical gradient across a membrane.
- (b) A decrease in membrane potential is referred to as membrane depolarization.
- (c) The term repolarization is defined as the reestablishment of the original membrane potential.
- (d) The diffusion of potassium ions out of a nerve cell make the inside of the membrane negative.
- (e) The sodium channel in muscle and nerve cells is a voltage-gated channel.

18. _____ are the principal transporters of cholesteryl esters to tissues.

- (a) Chylomicrons
- (b) Very low density lipoprotein
- (c) Intermediate density lipoprotein
- (d) Low density lipoprotein
- (e) All of the above are true

19. All of the following are enzymatic activities found in fatty acid synthase except

- (a) β -Ketoacyl-ACP reductase
- (b) Malonyl/acetyl transferase
- (c) Thioesterase
- (d) Lipoxygenase
- (e) β -Hydroxyacyl-ACP dehydratase

20. In the eukaryotic cell cycle the M(itosis) phase occurs after the _____ phase.
 - (a) G₀
 - (b) G₁
 - (c) G₂
 - (d) S
 - (e) None of the above are correct
21. Which of the following lipids have signaling functions?
 - (a) Triacylglycerols
 - (b) Steroids
 - (c) Bile salts
 - (d) Prostaglandins
 - (e) α -tocopherol
22. Asparagine is formed from aspartic acid and _____.
 - (a) SAM
 - (b) Glutamine
 - (c) Ammonium ions
 - (d) Both A and C are correct
 - (e) All of the above are correct
23. Autophagy is
 - (a) Used to degrade extracellular material
 - (b) Another term for phagocytosis
 - (c) Used to degrade worn out intracellular components
 - (d) Used to degrade secreted intercellular components
 - (e) Another term for endocytosis
24. Which of the following statements is not true of mRNA?
 - (a) Prokaryotic mRNAs are mainly polycistronic
 - (b) Eukaryotic mRNAs are mainly monocistronic
 - (c) Eukaryotic mRNAs are extensively modified after synthesis
 - (d) Prokaryotic mRNAs are immediately transmitted into protein without covalent modifications
 - (e) Prokaryotic mRNAs are capped with 7-methylguanosine
25. Place the following steps of general recombination in chronological order
 - i. DNA ligase seals the cut ends
 - ii. A second series of DNA strand cuts occurs opposite the first crossover strands
 - iii. Two homologous DNA molecules become paired
 - iv. DNA polymerase fills any gaps and DNA ligase seals the cut strands
 - v. Two of the DNA strands are cleaved
 - vi. The two strand segments cross over
 - (a) i, iii, v, iv, ii, vi
 - (b) iii, iv, vi, i, vi, iii
 - (c) iv, ii, v, i, ii, iv
 - (d) iii, v, vi, i, ii, iv
 - (e) v, vi, i, ii, iv, ii

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非選擇題：

1. Briefly describe glycolysis, citric acid cycle, and gluconeogenesis? Where do these pathways take place in the cell? (10%)
2. Draw a mitochondrion. Explain how ATP is generated. In addition to ATP generation, what other pathways are done in the mitochondria? Why reactive oxygen species (ROS) are frequently generated in mitochondria? (10%)
3. Describe how fat is digested in the intestine, mobilized into the bloodstream, transported into the cell, and oxidized? (10%)
4. In the hormonal regulation of fuel metabolism, how does the body maintain the normal glucose levels when you are hungry and after a dinner? How is mature insulin formed? (10%)
5. Give two examples of 2nd messengers in the signal transduction. What are their roles? How are these 2nd messengers turned off? Please briefly describe the signaling pathways mediated by G protein-coupled receptors? (10%)