

單選題 (每題 2.5 分，共 100 分) 不倒扣

1. Which of the following is a significant component of RNA but NOT of DNA?  
(A) Adenine  
(B) Uracil  
(C) Thymine  
(D) Guanine  
(E) Cytosine
2. Identify the vitamin that originates from cholesterol.  
(A) Vitamin D  
(B) Vitamin E  
(C) Vitamin B12  
(D) Vitamin K  
(E) Vitamin A
3. Which amino acid is called a helix breaker because of its unusual R group that creates a bend in the chain?  
(A) Histidine  
(B) Proline  
(C) Serine  
(D) Glycine  
(E) Arginine
4. What is the role of the ribosome in polypeptide elongation during protein translation?  
(A) Remove the noncoding intron  
(B) Break hydrogen bonds between the tRNA and the mRNA  
(C) Travel back and forth between the nucleus and the growing polypeptide, with information on which amino acids should be added  
(D) Remove incorrectly added amino acids  
(E) Move along the mRNA transcript bonding amino acids to each other

5. Which word describes the energy-requiring metabolic pathways that yield complex molecules from simpler precursors?
- (A) Amphibolic
  - (B) Autotrophic
  - (C) Catabolic
  - (D) Endergonic
  - (E) Exergonic
6. At physiologic blood pH, what is the primary ionic form of ammonia?
- (A)  $N_2$
  - (B)  $NH_2^-$
  - (C)  $NH_3$
  - (D)  $NH_4^+$
  - (E) None of the above
7. Which protein structure is affected primarily by hydrogen bonding?
- (A) Primary structure
  - (B) Secondary structure
  - (C) Tertiary structure
  - (D) Quaternary structure
  - (E) None of the above
8. Which of the following statements regarding muscle contraction is correct?
- (A) During muscle contraction, the sarcomere elongates.
  - (B) During muscle contraction, the I-band lengthens
  - (C) During muscle contraction, the H-zone becomes shorter
  - (D) During muscle contraction, the A-band extends
  - (E) During muscle contraction, the distance between the Z-line and the M-line increases
9. Which of the following RNA molecules exhibit catalytic activity?
- (A) mRNA
  - (B) tRNA
  - (C) rRNA
  - (D) miRNA
  - (E) siRNA

10. Which amino acids are exclusively ketogenic?
- (A) Arginine and lysine
  - (B) Lysine and leucine
  - (C) Methionine and serine
  - (D) Tryptophan only
  - (E) Valine and isoleucine
11. Which post-translational modifications can occur in the serine residue of a protein?
- (A) Glycosylation
  - (B) Lipidation
  - (C) Nitrosylation
  - (D) Ubiquitination
  - (E) All the above
12. Which of the following is **NOT** a common feature shared by most transduction systems for hormones and sensory stimuli that involve trimeric G proteins?
- (A) Cyclic nucleotides
  - (B) Nuclear receptors
  - (C) Receptors that interact with a G protein
  - (D) Receptors with multiple transmembrane segments
  - (E) Self-inactivation
13. The plasma membrane of *E. coli* consists of approximately 75% lipids and 25% proteins by weight. For each protein molecule with an average molecular weight ( $M_r$ ) of 50,000, how many membrane lipid molecules (average  $M_r$  750) are present?
- (A) 2
  - (B) 20
  - (C) 200
  - (D) 2,000
  - (E) 20,000
14. Which of the following statements is true regarding monoclonal antibodies when compared to polyclonal antibodies?
- (A) They are labeled with chemicals that can be visualized
  - (B) They are produced by cells from the same organism that produced the antigen
  - (C) They are synthesized by a population of identical, or "cloned," cells
  - (D) They are synthesized only in living organisms
  - (E) They have only a single polypeptide chain that can recognize an antigen

15. Which molecule is involved in HDL-mediated reverse cholesterol transport (RCT) to the liver?
- (A) Acetyl-CoA Carboxylase (ACC)
  - (B) Acyl-CoA cholesterol acyl transferase (ACAT)
  - (C) ATP Binding Cassette Transporter A1 (ABCA1)
  - (D) Hydroxymethylglutaryl-CoA reductase (NADPH)
  - (E) Sterol regulatory element-binding proteins (SREBPs)
16. Identify the correct monomers for starch and glycogen from the following options:
- (A)  $\alpha$ -D-glucose
  - (B)  $\beta$ -D-glucose
  - (C) Fructose
  - (D) glucose 1-phosphate
  - (E) sucrose
17. What can lead to the development of the human genetic disease phenylketonuria (PKU)?
- (A) A deficiency of protein in the diet
  - (B) Overproduction of ketone bodies
  - (C) Lack of phenylalanine decarboxylase
  - (D) Deficiency in aromatic amino acid transaminase
  - (E) Lack of an enzyme required for converting phenylalanine to tyrosine
18. Which transport process requires the input of energy?
- (A) Facilitated diffusion
  - (B) Passive diffusion
  - (C) Secondary active transport
  - (D) All of the above
  - (E) None of the above
19. Which structural feature is most prevalent in myosin molecules?
- (A) The  $\alpha$  helix
  - (B) The  $\beta$  structure
  - (C) The Fab domain
  - (D) The light chain
  - (E) The meromyosin domain

20. Which of the following statements about aromatic amino acids is correct?
- (A) All are strongly hydrophilic.
  - (B) Histidine's ring structure results in its being categorized as aromatic or basic, depending on pH.
  - (C) On a molar basis, tryptophan absorbs more ultraviolet light than tyrosine.
  - (D) The major contribution to the characteristic absorption of light at 280 nm by proteins is the phenylalanine R group.
  - (E) The presence of a ring structure in its R group determines whether or not an amino acid is aromatic.
21. FADH<sub>2</sub> is a product of which of the following reactions?
- (A) Malate → Oxaloacetate
  - (B) Pyruvate → Acetyl-CoA
  - (C) Succinyl-CoA → Succinate
  - (D) Succinate → Fumarate
  - (E) Succinate → Malate
22. All are important reasons to phosphorylate glucose in the first step of glycolysis EXCEPT:
- (A) the large positive free energy is important in getting the pathway started
  - (B) glucose-6-phosphate has a negative charge preventing transport out of the cell
  - (C) the concentration of free glucose in the cell is low favoring influx of glucose
  - (D) phosphorylation keeps the glucose in the cell
  - (E) regulatory control can be imposed only at a reaction not at equilibrium
23. All are true for the isomerase reaction of glucose-6-phosphate to fructose-6-phosphate EXCEPT:
- (A) Mg<sup>2+</sup> is required for activity
  - (B) it is an aldose to ketose isomerization
  - (C) "moving" the carbonyl from C-1 to C-2 creates a new primary alcohol group at C-1
  - (D) the reaction is irreversible with a large negative  $\Delta G$
  - (E) the enzyme belongs to the isomerase class of enzymes

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24. Triose phosphate isomerase is very similar in function to:
- (A) hexokinase
  - (B) phosphoglucoisomerase
  - (C) phosphofructokinase
  - (D) fructose-1,6-bisphosphate aldolase
  - (E) none of the above
25. For the pyruvate kinase catalyzed reaction, the correct sequence of events is:
- A. phosphoryl group transferred
  - B. water on  $Mg^{2+}$ -ADP replaced by phosphoryl group of PEP
  - C.  $Mg^{2+}$  dissociates from the  $\alpha$ -P of ADP
  - D. the enolate of pyruvate is protonated
- (A) A, B, C, D
  - (B) B, D, A, C
  - (C) B, C, A, D
  - (D) A, D, B, C
  - (E) B, A, C, D
26. The tangling of DNA strands during replication is prevented by \_\_\_\_\_
- (A) Topoisomerases
  - (B) Helicases
  - (C) Ligases
  - (D) Primases
  - (E) Unwindases
27. DNA transposition can cause gene \_\_\_\_\_.
- (A) Duplication
  - (B) Deletion
  - (C) Transcription
  - (D) Both A and B are correct
  - (E) All of the above are correct
28. In animals the vast majority of water-soluble hormones are
- (A) Peptides
  - (B) Steroids
  - (C) Polypeptides
  - (D) Carbohydrates
  - (E) Both A and C are correct

注意：背面有試題

29. The biological effects of atrial natriuretic factor appear to be mediated by \_\_\_\_\_.
- (A) cAMP
  - (B) cGMP
  - (C) PIP2
  - (D) AG
  - (E) IP3
30. Fatty acids are mobilized from adipose cells in response to all of the hormones EXCEPT:
- (A) ACTH (adrenocorticotropic hormone)
  - (B) glucagon
  - (C) insulin
  - (D) epinephrine (adrenaline)
  - (E) all are true
31. Chylomicrons:
- (A) are formed in adipose tissue
  - (B) are primary energy sources for the brain
  - (C) transport dietary triacylglycerols through the bloodstream
  - (D) are formed in and secreted by the liver
  - (E) contain more phospholipid than triacylglycerol molecules
32. Where in the cell are fatty acids condensed with coenzyme A to form acyl-CoA?
- (A) mitochondrial matrix
  - (B) cytoplasm
  - (C) outer mitochondrial membrane or endoplasmic reticulum
  - (D) inner mitochondrial membrane
  - (E) none of the above
33. There is no transporter for acetyl-CoA to exit the mitochondria, so the carbons must be converted to \_\_\_\_\_ for transport to the cytosol.
- (A) acetone
  - (B) butyrate
  - (C) citrate
  - (D) pyruvate
  - (E) malonate

34. The committed step in fatty acid biosynthesis, formation of malonyl-CoA, is catalyzed by:
- (A) fatty acid synthase
  - (B) pyruvate carboxylase
  - (C) propionate carboxylase
  - (D) acetyl-CoA carboxylase
  - (E) ATP-citrate lyase
35. Hexokinase and glucokinase belong to the kinase subclass of what class of enzymes?
- (A) oxidoreductase
  - (B) isomerase
  - (C) transferase
  - (D) hydrolase
  - (E) lyase
36. All of the following characterize phosphofructokinase-1 (PFK-1) EXCEPT
- (A) the most important regulatory site in glycolysis
  - (B) ATP increases the affinity of the enzyme for fructose-6-phosphate
  - (C) PFK-1 activity is a function of the energy charge of the cell
  - (D) AMP decreases the  $K_m$  of PFK-1 for fructose-6-phosphate
  - (E) the subunits of PFK-1 behave cooperatively
37. Which enzymes of the TCA cycle catalyze oxidative decarboxylation reactions?
- (A) malate dehydrogenase and citrate synthase
  - (B) fumarase and succinate dehydrogenase
  - (C)  $\alpha$ -ketoglutarate dehydrogenase and succinate dehydrogenase
  - (D) isocitrate dehydrogenase and  $\alpha$ -ketoglutarate dehydrogenase
  - (E) aconitase and succinate dehydrogenase
38. The coenzymes listed below are associated with  $\alpha$ -ketoglutarate dehydrogenase complex EXCEPT:
- (A) [FAD]
  - (B) TPP
  - (C) lipoamide
  - (D)  $NAD^+$
  - (E) Biotin



39. How many NADH molecules are produced in the TCA cycle per molecule of acetyl-CoA oxidized?
- (A) 1
  - (B) 2
  - (C) 3
  - (D) 4
  - (E) 5
40. It is crucial that regulation occur at pyruvate dehydrogenase because:
- (A) pyruvate kinase is reversible
  - (B) lactate dehydrogenase is the only other enzyme to use pyruvate
  - (C) the product acetyl-CoA is committed to oxidation in the citric acid cycle or fatty acid biosynthesis
  - (D) alanine aminotransferase would use the pyruvate
  - (E) all of the above