Please select the best answer: (2% for each)

1. Enzymes are biologicl catalysts that enhance the rate of reaction by:
   A. increasing the amount of free energy released.
   B. decreasing the amount of free energy released.
   C. increasing the change of entropy.
   D. increasing the activation energy.
   E. decreasing the activation energy.

2. The major carrier of chemical energy in all cells is:
   A. adenosine monophosphate.
   B. adenosine diphosphate.
   C. adenosine triphosphate.
   D. adenosine tetraphosphate.
   E. acetyl triphosphate.

3. The three-dimensional structure of a protein is determined primarily by:
   A. noncovalent interaction with lipids, which provide a folding framework.
   B. noncovalent interactions with nucleic acids.
   C. the order of sequence of amino acids in the protein.
   D. the number of amino acids in the protein.
   E. its native conformation.

4. In eukaryotes, the nucleus is enclosed by a double membrane called the :
   A. cell membrane.
   B. nucleolus.
   C. nucleoplasm.
   D. nucleosome.
   E. nuclear envelope.

5. After the disruption of plasma membrane by homogenization, the organelles in the cell can be separated physically using:
   A. gas chromatography.
   B. electron microscopy.
   C. centrifugation.
   D. x-ray crystallography.
   E. salt precipitation.

6. An amino acid contains a carboxylic acid and an amine. Condensation of an amino group and carboxyl group with loss of water forms a(n):
   A. carbonyl.
   B. ester.
   C. imidazole.
   D. guanidine.
   E. amide.

(背面仍有題目,請繼續作答)

7. The macromolecules that serve in the storage and transmission of genetic information are:
   A. carbohydrates.
   B. lipids.
   C. nucleic acids.
   D. proteins.
   E. none of the above.

8. The monomeric unit of starch is:
   A. cellulose.
   B. glucose.
   C. ribose.
   D. deoxyribose.
   E. glycine.

9. The pH of a solution A is 7.4 and the pH of a solution B is 1.4. The solution A has:
   A. 6 times lower [H+] than the solution B.
   B. 60 times lower [H+] than the solution B.
   C. 600 times lower [H+] than the solution B.
   D. a million times lower [H+] than the solution B.
   E. none of the above.

10. Which of the following statements about buffers is true?
   A. The strongest buffers are those composed of strong acids and strong bases.
   B. The pH of a buffered solution remains constant no matter how much acid or base is added to the solution.
   C. A buffer composed of a weak acid of pKa = 5 is stronger at pH 4 than at pH 6.
   D. When pH = pKa, the weak acid and salt concentrations in a buffer are equal.
   E. None of the above.

11. Amino acids are ampholytes because they can function as either a(n):
   A. polar or a nonpolar molecule.
   B. acid or a base.
   C. neutral molecule or an ion.
   D. transparent or a light-absorbing compound.
   E. standard or a nonstandard monomer in proteins.

12. An tetrapeptide composed of two repeating glycylalanyl units has:
   A. two free amino and two free carboxyl groups.
   B. a single free amino group on an alanyl residue.
   C. two free carboxyl groups, both on glycyl residues.
   D. a single free amino group on an alanyl residue and a single free carboxyl group on a glycyl residue.
   E. a single free amino group on a glycyl residue and a single free carboxyl group on an alanyl residue.

13. The specific activity :
   A. is the activity (enzyme units) in a milligram of protein.
   B. is the activity of a specific protein.
   C. is measured only under optimal conditions.
   D. refers to proteins other than enzymes.
   E. refers only to a purified protein.

14. Which of the following compounds should elute first in size-exclusion chromatography?
    A. Cytochrome C, 13,000
    B. Immunoglobulin, 145,000
    C. Ribonuclease A, 13,700
    D. RNA polymerase, 450,000
    E. Serum albumin, 68,500

15. Which of the following is considered not a weak interactions in proteins?
    A. Van der Waals forces.
    B. Hydrogen bonds.
    C. Ionic bonds.
    D. Peptide bonds.
    E. Hydrophobic interactions.

16. The role of an enzyme in an enzyme-catalyzed reaction is to:
    A. ensure that the product is more stable than the substrate.
    B. make the free-energy change for the reaction more favorable.
    C. increase the rate at which substrate is converted into product.
    D. ensure that all the substrate is converted to product.
    E. do none of the above.

17. In competitive inhibition, an inhibitor:
    A. binds at several 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 characteristic V max of the enzyme.

18. Which of the following is not a fat-soluble vitamin?
    A. A.
    B. C.
    C. D.
    D. E.
    E. K.

19. 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 fatty acyl chain length.
    C. an increase in the number of double bonds in fatty acids.
    D. the binding of water to the fatty acyl side chains.
    E. none of the above.

20. The fluidity of a lipid bilayer will be increased by:
    A. decreasing the number of unsaturated positions.
    B. increasing the length of the alkyl chains.
    C. increasing the temperature.
    D. decreasing the temperature.
    E. none of the above.

(背面仍有題目,請繼續作答)

21. The reference compound for naming D and L isomers of sugars is:
   A. glucose.
   B. glyceradehyde.
   C. ribose.
   D. fructose.
   E. sucrose.

22. Glycogen is polymers of:
   A. α-D-glucose.
   B. β-D-glucose.
   C. glucose-1-phosphate.
   D. sucrose.
   E. fructose.

23 In a nucleic acid duplex, cytosine typically base-pairs with:
   A. guanine.
   B. uracil.
   C. thymine.
   D. adenosine.
   E. inosine.

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

Phosphocreatine → creatine + Pi $\Delta G^{0'}$ = -43.0 kj/mol
ATP → ADP + Pi $\Delta G^{0'}$ = - 30.5 kj/mol

What is the ovall $\Delta G^{0'}$ for the following reaction?

Phosphocreatine + ADP → Creatine + ATP

   A. −12.5 kj/mol
   B. +12.5 kj/mol
   C. −74.0 kj/mol
   D. +74.0 kj/mol
   E. none of the above.

25. Biological oxidation-reduction reactions always involve:
   A. transfer of hydrogens.
   B. formation of water.
   C. mitochondria.
   D. transfer of electrons.
   E. direct participation of oxygen.

26. Which of the following is a cofactor in the reaction catalyzed by glyceraldehyde-3-phosphate dehydrogenase?
   A. $NADP^+$
   B. NAD^+
   C. ATP
   D. Heme
   E. Cu^{2+}

27. The conversion of one mole of glucose-6-phosphate to two moles of lactate in glycolysis is accomplished by a net gain of:
   A. three moles of ATP.
   B. two moles of ATP.
   C. one mole of ATP.
   D. one mole of NADH.
   E. none of the above.

28. When a muscle is stimulated to contract aerobically, less lactic acid is formed than when it contract anaerobically because:
   A. aerobic conditions prevent the activation of phosphorylase and make less substrate available for glycolysis.
   B. under aerobic conditions most of the pyruvate generated as a result of glycolysis is oxidized by the citric acid cycle rather than reduced to lactate.
   C. the lactic acid generated is rapidly incorporated into lipids under aerobic conditions.
   D. under aerobic conditions in muscle, the major energy-yielding pathway is the pentose phosphate pathway, which does not produce lactate.
   E. muscle is metabolically less active under aerobic than anaerobic conditions.

29. Which of the following processes is not located in mitochondria?
   A. Citric acid cycle.
   B. Fatty acid oxidation.
   C. Glycolysis.
   D. Electron transfer to oxygen.
   E. Oxidative phosphorylation.

30. Oxidation of one mole of acetyl-CoA via citric acid cycle results in net:
   A. production of one mole of citrate.
   B. consumption of one mole of oxaloacetate.
   C. production of 7 moles of ATP.
   D. production of 2 moles of CO_2.
   E. production of one mole of succinate.

31. Entry of acetyl-CoA into the citric acid cycle is decreased when:
   A. the ratio of [ATP]/[ADP] is high.
   B. [AMP] is high.
   C. The ratio of [NAD+]/[NADH] is high.
   D. NADH is rapidly oxidized through the respiratory chain.
   E. none of the above.

32. Which of these is able to cross the inner mitochondrial membrane?
   A. fatty acyl-CoA.
   B. malonyl CoA.
   C. acetyl CoA.
   D. fatty acyl carnitine.
   E. none of the above.

(背面仍有題目,請繼續作答)

33. The conversion of stearyl-CoA (18:0) to palmitoyl CoA (16:0) and a mole of acetyl CoA by the β-oxidation pathway results in the net formation of :
   A. 1 $FADH_2$ and 1 NADH.
   B. 2 $FADH_2$ and 2 NADH.
   C. 1 $FADH_2$ and 1 NADPH.
   D. 2 $FADH_2$, 2 NADH and 1 ATP.
   E. 1 $FADH_2$, 1 NADH and 1 ATP.

34. Saturated fatty acids are degraded two carbons at a time, producing acetyl CoA. Under aerobic conditions, how many ATP moleules would be produced per acetyl CoA formed?
   A. 3.
   B. 4.
   C. 5.
   D. 6.
   E. 7.

35. Glutamate is metabolically converted to α-ketoglutarate and NH_4^+ by a process described as:
   A. hydrolysis.
   B. deamination.
   C. oxidative deamination.
   D. reductive deamination.
   E. transmination.

36. If a person's urine contains unusually high concentrations of urea, which of the following diets has he or she probably been eating recently?
   A. very high carbohydrate, very low protein.
   B. very low carbohydrate, very high protein.
   C. very high fat, very low protein.
   D. very high fat, high carbohydrate, no protein
   E. none of the above.

37. In amino acid catabolism, the first reaction for many amino acids is a(n):
   A. decarboxylation requirring thiamine pyrophosphate.
   B. reduction requirring pyridoxal phosphate.
   C. transamination requirring pyridoxal phosphate.
   D. hydroxylation requirring NADPH and oxygen.
   E. oxidative deamination requirring NAD^+.

38. Almost all of the oxygen one consumes in breathing is converted to:
   A. carbon dioxide.
   B. carbon monodioxide and then to carbon dioxide.
   C. water.
   D. acetyl CoA.
   E. none of the above.

39. In humans, gluconeogenesis:
   A. helps to reduce blood glucose after a carbohydrate-rich meal.
   B. is essential in the conversion of fatty acids to glucose.
   C. can result in the conversion of protein into blood glucose.
   D. requires the enzyme hexokinase.
   E. is not a necessary process.

40. Glucagon in liver:
   A. activates glycogen phosphorylase and inactivate glycogen synthase.
   B. inhibits glycogen synthesis and activates glycogenolysis.
   C. acts by raising the concentration of cyclic AMP.
   D. opposes the effects of insulin on the liver.
   E. does all of the above.

41. The rate-limiting step in fatty acid synthesis is :
   A. formation of acetylCoA from acetate.
   B. the reaction catalyzed by acetylCoA carboxylase.
   C. condensation of acetyCoA and malonylCoA.
   D. the reduction of the acetoacetyl group to a β-hydroxybutyryl group.
   E. formation of malonylCoA from malonate and coenzyme A.

42. Which of the following compounds can be synthesized by plants but not by humans?
   A. Palmitate.
   B. Stearate.
   C. Linoleate.
   D. Pyruvate.
   E. Phosphatidylcholine.

43. Cholesterol is synthesized from:
   A. acetylCoA.
   B. malate.
   C. oxalate.
   D. lipoic acid.
   E. choline.

44. The normal sequence of action of these components of the hormonal hierarchy is:
   A. hypothalamus →adrenal cortex →anterior pituitary.
   B. anterior pituitary →adrenal cortex→hypothalamus.
   C. hypothalamus→anterior pituitary→adrenal cortex.
   D. adrenal cortex→hypothalamus→anterior pituitary.
   E. anterior piruitaery→hypothalamus→adrenal cortex.

45. The chromosomal region that is the point of attachment of the mitotic spindle is the:
   A. Alu sequence.
   B. telomere.
   C. centromere.
   D. intron.
   E. exon.

(背面仍有題目,請繼續作答)

46. Recombination repair most commonly results from:
   A. homologous genetic recombination.
   B. site-specific recombination.
   C. DNA transposition.
   D. none of the above.
   E. A, B, and C.

47. A single base change in an mRNA may result in:
   A. no observable mutation.
   B. a missense mutation.
   C. a nonsense mutatioon.
   D. all of the above.
   E. none of the above.

48. In the "activation" of an amino acid for protein synthesis:
   A. two separate enzymes are required, one to form the aminoacyl adenylate, the other to attach the amino acid to the tRNA.
   B. leucine can be attached to tRNA, if the aminoacyl-tRNA synthetase added is specific for leucine.
   C. methionine is first formylated, then attached to a specific-tRNA.
   D. the amino acid is attached to the 5' end of the tRNA through a phosphodiester bond.
   E. there is at least one specific activating enzyme and one specific tRNA for each amino acid.

49. The biological role of restriction enzyme is to:
   A. aid recombinant DNA research.
   B. 0restrict the size of DNA in certain bacteria.
   C. degrade foreign DNA that enters a bacterium.
   D. restrict the damage to DNA by ultraviolet light.
   E. make bacteria resistant to antibiotics.

50. In the laboratory, recombinant plasmids are commonly introduced into bacterial cells by:
   A. microinjection.
   B. transformation; temperature shock of cells incubated with plasmid DNA in the presence of $CaCl_2$.
   C. infection with a bacteriophage that carries the plasmid.
   D. mixing plasmids with an extract of broken cells.
   E. none of the above methods.