

長庚大學108學年度研究所碩士班招生考試試題

系所：生物醫學工程研究所碩士班

考試科目：生物化學

注意：請詳細閱讀下列試題，並請標明題號依試題順序將答案書寫於答案卷上。 本試題共5頁：第1頁

選擇題（每題2分，共50題，每題僅一正確答案，答錯不倒扣）；本份試題共5頁。

- Which of the following is NOT an intermediate of the citric acid cycle?
(A) Acetyl-CoA.
(B) Succinyl-CoA.
(C) α -ketoglutarate.
(D) Citrate.
(E) Oxaloacetate.
- In nucleoside, sugar is linked to:
(A) Nitrogen
(B) Oxygen Phosphate
(C) Carbon
(D) Phosphate
- What is the end product of glycolysis?
(A) Lactate
(B) Phosphoenolpyruvate
(C) Glycogen
(D) Pyruvate
(E) 3-phosphoglycerate
- Which of the following is a heteropolysaccharide?
(A) Glycogen
(B) Starch
(C) Hyaluronate
(D) Chitin
- The pH of a solution is determined by?
(A) concentration of salt
(B) relative concentration of acids and bases
(C) dielectric constant of the medium
(D) environmental effect
- The positive effector in hemoglobin is:
(A) ATP
(B) H^+
(C) CO_2
(D) Bisphosphoglycerate
(E) Oxygen molecule
- Which amino acid plays the key role in formation of disulfide bond?
(A) Serine
(B) Lysine
(C) Methionine
(D) Cysteine
(E) Proline
- Which molecule receives the energy from glycolysis and citric acid cycle and transmits the energy to electron transfer chain?
(A) NADH
(B) Pyruvate
(C) ATP
(D) Acetyl-CoA
(E) GTP
- The major element of secondary structure in myoglobin and hemoglobin is
(A) the P-strand
(B) the α -helix
(C) the reverse turn
(D) the β -pleated sheet
(E) All of these
- Which of the following forces is the most favorable for protein folding?
(A) Hydrophobic Interactions
(B) Conformational entropy
(C) Vander Waals interactions
(D) Hydrogen bonds
- Generally, antibody is NOT applied to?
(A) Immunofluorescence
(B) PCR
(C) Western blot
(D) ELISA
(E) Protein microarray

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12. What is the heaviest of the twenty amino acids?

- (A) Phenylalanine
- (B) Tyrosine
- (C) Tryptophan
- (D) Histidine

13. The main function of trypsin is for:

- (A) Digestion of carbohydrate
- (B) Digestion of lipid
- (C) Digestion of DNA
- (D) Digestion of RNA
- (E) Digestion of peptide

14. Functional DNA is NOT found in:

- (A) Bacterial nucleoids.
- (B) Nuclei.
- (C) Chloroplasts.
- (D) Lysosomes.
- (E) Mitochondria.

15. In humans, pyruvate can be converted to:

- (A) Acetyl-CoA only
- (B) Acetyl-CoA and lactate
- (C) Ethanol only
- (D) Lactate only
- (E) Acetyl-CoA and ethanol

16. The major conformation of collagen belongs to:

- (A) Turn
- (B) Sheet
- (C) Helix
- (D) Random coil

17. Fibrous proteins, such as collagen, have which one of the following properties?

- (A) Highly soluble in water
- (B) Serve structural roles in the cell
- (C) Their hydrophilic residues are directed into the interior of the protein
- (D) Exhibit enzymatic activity
- (E) Monomeric

18. The isoelectric point of an amino acid is defined as the pH

- (A) where the molecule carries no electric charge
- (B) where the carboxyl group is uncharged
- (C) where the amino group is uncharged
- (D) of maximum electrolytic mobility

19. Which of the following amino acid contain an imidazolium moiety?

- (A) Valine Alanine
- (B) Alanine
- (C) Histidine
- (D) Cysteine

20. The best way to determine the location of protein in the purification scheme is to measure the

- (A) rate of ATP synthesis
- (B) mass spectroscopy of the protein
- (C) changes in the refractive index
- (D) UV absorption

21. In active transport, the membrane structure that functions is

- (A) cholesterol
- (B) integral proteins
- (C) carbohydrates
- (D) hydrophobic molecules

22. Cholesterol is essential for normal membrane functions because it

- (A) plugs up the cardiac arteries of older men
- (B) keeps membranes fluid
- (C) spans the thickness of the bilayer
- (D) cannot be made by higher organisms

23. The plasma membrane is a selectively permeable barrier due to presence of specific transport

- (A) amino acids
- (B) carbohydrates
- (C) proteins
- (D) none of these

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24. For each turn of the citrate acid cycle, there is No net production of :
- (A) NADH
 - (B) FADH₂
 - (C) GTP or ATP
 - (D) Citrate
 - (E) CO₂
25. The oxidation of methanol (wood alcohol) in human retina tissue indirectly leads to
- (A) pressure builds up
 - (B) blindness
 - (C) colour blindness
 - (D) all of these
 - (E) None of these
26. In ion-exchange chromatography
- (A) proteins are separated on the basis of their shape
 - (B) proteins are separated on the basis of their size
 - (C) proteins are separated on the basis of their net charge
 - (D) All of the above
 - (E) none of the above
27. Which technique or instrument can be used to determine protein structure?
- (A) HPLC
 - (B) Immunohistochemistry
 - (C) Northern blot
 - (D) Protein microarray
 - (E) X-ray crystallography
28. Where the acyl-CoA formed in the cytosol is transported for oxidation?
- (A) Microsomes
 - (B) Mitochondrial matrix
 - (C) Endoplasmic reticulum
 - (D) Remains in cytosol
 - (E) None of these
29. The coding segments of a stretch of DNA are called:
- (A) Promoters
 - (B) Chromatin
 - (C) Transposons
 - (D) Exons
 - (E) Introns
30. What is the specificity of the Clostripain protease?
- (A) It cleave after Arg residues
 - (B) It cleave after His residues
 - (C) It cleave after Lys residues
 - (D) None of the above
31. Simple nerve reflexes use signaling molecules called
- (A) nitric oxides
 - (B) proteases
 - (C) G proteins
 - (D) neurotransmitters
 - (E) lipids
32. Reverse transcriptase produces
- (A) DNA from peptides
 - (B) RNA from DNA
 - (C) RNA from RNA
 - (D) DNA from protein
 - (E) DNA from RNA
33. A PCR cycle consists of
- (A) three steps, denaturation, primer annealing and elongation
 - (B) three steps, denaturation, initiation and elongation
 - (C) three steps, primer annealing, elongation and termination
 - (D) three steps, initiation, elongation and termination

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34. Which of the following is not a type of signaling molecule?
(A) Adenylate cyclase
(B) Testosterone
(C) Insulin
(D) Thyroxin
35. Nitroglycerin has long been administered to human patients suffering from chronic chest pain (angina). This medication works because it
(A) is broken down into hormones that affect the heart
(B) breaks down into nitric oxide, which increases blood flow to the heart
(C) Interferes with chemical cascades that trigger contraction of heart muscle
(D) mimics the action of signal receptors
36. The binding of ligands to many G-proteins linked receptors leads to shortlived
(A) decrease in the concentration of certain intracellular signaling molecules called second messenger
(B) increase in the concentration of certain intracellular signaling molecules called second messenger
(C) decrease in the concentration of certain extracellular signaling molecules called first messenger increase in the concentration of certain extracellular signaling molecules called first messenger
(D) increase in the concentration of certain extracellular signaling molecules called first messenger
37. Animals cannot convert fatty acids into glucose because
(A) absence of malate synthase
(B) absence of dehydrogenase
(C) acetyl CoA can not be converted to pyruvate
(D) absence of a-ketoglutarate dehydrogenase
38. Chylomicrons are synthesized in
(A) intestine
(B) blood
(C) liver
(D) pancreas
39. The peptide bond in proteins is
(A) only found between proline residues
(B) usually cis unless proline is the next amino acid
(C) usually trans unless proline is the next amino acid
(D) is planar because of steric hinderance
40. A molecule that can be covalently linked to a non-immunogenic antigen to make it an immunogen is called a (n)
(A) adjuvant
(B) carrier
(C) mitogen
(D) hapten
41. An enzyme that recognizes foreign DNA, and results in a cut in that DNA is called
(A) transposase
(B) helicase
(C) reverse transcriptase
(D) restriction endonuclease
42. Nucleotide bases and aromatic amino acids absorb light respectively at
(A) 280 and 260 nm
(B) 260 and 280 nm
(C) 240 and 280 nm
(D) 260 and 220 nm
43. Which of the following best describes the cholesterol molecule?
(A) Nonpolar, uncharged
(B) Nonpolar, charged
(C) Amphipathic
(D) Polar, charged

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44. The antibiotic penicillin is a small molecule that does not induce antibody formation. However, penicillin binds to serum proteins and forms a complex that in some people induces antibody formation resulting in an allergic reaction. Penicillin is therefore
- (A) an antigen
 - (B) a hapten
 - (C) an immunogen
 - (D) both an antigen and a hapten
45. In DNA double helix, the two DNA chains are held together by
- (A) covalent bonds between the pair of bases
 - (B) hydrogen bonds between the pair of bases
 - (C) ionic bonds between the pair of bases
 - (D) All of the above
 - (E) none of the above
46. The 5' and 3' numbers are related to the
- (A) carbon number in sugar
 - (B) length of the DNA strand
 - (C) the number of phosphates
 - (D) the base pair rule
 - (E) none of the above
47. Which of the following structures is expected in a bacterium?
- (A) Nucleus
 - (B) Plasma membrane
 - (C) Golgi apparatus
 - (D) Endoplasmic reticulum
 - (E) None of the above
48. How many ATP equivalents per mole of glucose input are required for gluconeogenesis?
- (A) 2
 - (B) 4
 - (C) 6
 - (D) 8
49. Which of the following can act as precursors for gluconeogenesis?
- (A) Lactate
 - (B) Glycerol
 - (C) Alanine
 - (D) All of the above
 - (E) none of the above
50. The anaerobic conversion of 1 mol of glucose to 2 mol of lactate by fermentation is accompanied by a net gain of :
- (A) 1 mol of NADH
 - (B) 2 mol of NADH
 - (C) 1 mol of ATP
 - (D) 2 mol of ATP
 - (E) None of the above