

國立宜蘭大學

102 學年度研究所碩士班考試入學

生物化學試題

(生物技術與動物科學系生物技術碩士班)

准考證號碼：

《作答注意事項》

1. 請先檢查准考證號碼、座位號碼及答案卷號碼是否相符。
2. 考試時間：100 分鐘。
3. 本試卷共有 單選題 50 題，一題 2 分，共計 100 分。
4. 請將答案寫在答案卷上。
5. 考試中禁止使用大哥大或其他通信設備。
6. 考試後，請將試題卷及答案卷一併繳交。
7. 本試卷採雙面影印，請勿漏答。
8. 應試時不得使用電子計算機。

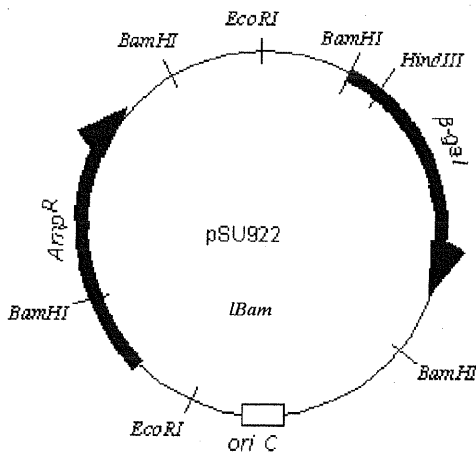
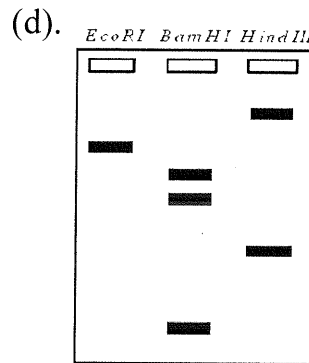
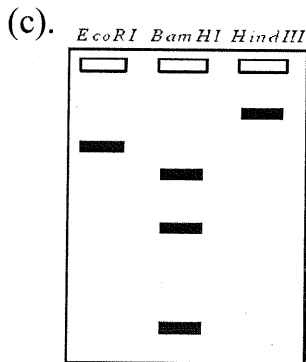
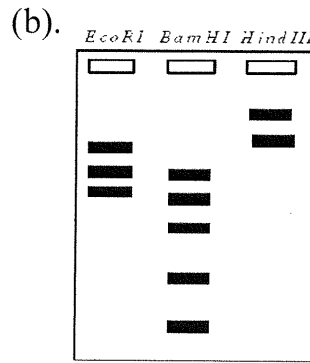
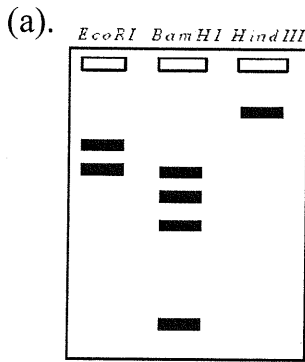
1. () The amino acid with a side-chain pKa near neutrality and which therefore plays an important role as proton donor and acceptor in many enzyme catalyzed reactions is: (a) Histidine. (b) Cysteine. (c) Aspartate. (d) Lysine.
2. () Which of the peptides would absorb light at 280 nm?
(a) Ala-Lys-His (b) Ser-Gly-Asn (c) Ala-Ala-Trp (d) Val-Pro-Leu
3. () Secondary structural elements are often observed in groupings commonly called _____. (a) motifs (b) domains (c) clusters (d) lobes
4. () The Protein Data Bank (PDB) is a database that primarily contains information about _____. (a) gene sequences (b) enzyme specificity (c) protein structure (d) protein function
5. () All of the information necessary for a protein to achieve its intricate architecture is contained within its _____ structure.
(a) primary (b) secondary (c) tertiary (d) quaternary
6. () Using acid hydrolysis for amino acid composition analysis, _____ will be destroyed and must be estimated by other means. (a) Lys (b) Leu (c) Trp (d) Asp
7. () After treating a protein with trypsin, which of the following techniques could be used to determine its identity by peptide mass fingerprinting? (a) NMR (b) MALDI-TOF mass spectrometer (c) HPLC (d) gel electrophoresis
8. () What is the overall net charge on the peptide Lys-Arg-Ser-Glu at pH 7.0?
(a) +2 (b) +1 (c) 0 (d) -1
9. () A Ramachandran plot shows: (a) the amino acid residues which have the greatest degree of rotational freedom. (b) the sterically allowed rotational angles between R groups and α -carbons in a peptide. (c) the sterically allowed rotational angles between $C\alpha$ and the amide nitrogen ($C\alpha$ -N) as well as between $C\alpha$ and the amide carbonyl carbon ($C\alpha$ -CO). (d) the sterically allowed rotational angles about the amide nitrogen (NH) and CO.
10. () _____ are proteins that help other proteins to fold. (a) Immunoglobulins (b) Phospholipases (c) Synthetases (d) Molecular chaperones

11. () All of the following are properties of a coenzyme EXCEPT: (a) They are usually actively involved in the catalytic reaction of the enzyme. (b) They can serve as intermediate carriers of functional groups. (c) They are protein components. (d) They may contain vitamins as part of their structure.
12. () The specific site on the enzyme where _____ binds and catalysis occurs is called the _____ site. (a) coenzyme; substrate (b) substrate; active (c) coenzyme; regulatory (d) regulatory; active
13. () When binding one equivalent of S to an allosteric protein enhances the binding of additional equivalents of S to the same protein molecule, it is termed a(n): (a) negative heterotropic effector. (b) positive homotropic effector. (c) positive heterotropic effector. (d) negative homotropic effector.
14. () Catalytic antibodies, also called _____, are generated against an antigen that is _____: (a) abzymes; an analog of the transition-state intermediate in the reaction. (b) abzymes; the substrate of the reaction. (c) zymogens; an analog of the product of the reaction. (d) holoenzyme; an analog of the transition-state intermediate in the reaction.
15. () Which of the following monosaccharides is a ketose?
(a) glucose (b) mannose (c) galactose (d) fructose
16. () Sucrose is composed of the following simple sugars: (a) fructose only (b) galactose and glucose (c) glucose and fructose (d) galactose and fructose
17. () Which of the following bond is the bond formed between simple sugars:
(a) peptide bond (b) glycosidic bond (c) phosphodiester bond (d) none of the above
18. () The main difference, on the surface of a red blood cell, between the A-B-O major blood groups depends on: (a) the presence or absence of a certain protein sequence (b) the presence or absence of a certain sugar (c) the presence or absence of a certain lipid (d) all of these
19. () What is the net ATP yield per glucose during glycolysis?
(a) 1 (b) 2 (c) 3 (d) 4

20. () Which of the following enzymes interconverts an aldose and a ketose?
(a) phosphatase (b) mutase (c) isomerase (d) kinase
21. () Glycogen is mainly found in: (a) brain (b) liver (c) kidney (d) bone
22. () Gluconeogenesis is the synthesis of: (a) fatty acids from glucose (b) glucose from non-carbohydrate precursors (c) glycogen from glucose (d) pyruvate from glucose
23. () The conversion of a sugar's carbonyl to an alcohol is: (a) an oxidation reaction (b) a reduction reaction (c) a glycosidic reaction (d) none of the above.
24. () Which of the following is not a reducing sugar?
(a) sucrose (b) glucose (c) fructose (d) maltose
25. () The following sugar is also called blood sugar:
(a) sucrose (b) glucose (c) fructose (d) maltose
26. () Which of the following molecules have the highest degree of [1→6] branching linkages: (a) starch (b) glycogen (c) amylopectin (d) amylase
27. () Which of the following sugars can be a substrate for hexokinase?
(a) mannose (b) glucose (c) fructose (d) all of these
28. () Which enzyme is the key regulatory enzyme in glycolysis? (a) enolase (b) phosphofructokinase (c) aldolase (d) glyceraldehyde-3-phosphate dehydrogenase
29. () The carrier molecule which transports fatty acids through the inner mitochondrial membrane is (a) ATP. (b) Carnitine. (c) Coenzyme A. (d) Lipoic Acid.
30. () When an acyl group is being transferred from the cytosol to the mitochondria for oxidation, the order of the enzymes it encounters is (a) CPT-I: Carnitine Translocase: CPT-II. (b) Carnitine Translocase: CPT-I: CPT-II. (c) CPT-II: Carnitine Translocase: CPT-I. (d) none of these.
31. () The processing of one molecule of stearic acid (18 carbons) by β -oxidation ?
(a) requires 8 cycles of β -oxidation and produces 9 molecules of acetyl-CoA.
(b) requires 8 cycles of β -oxidation and produces 8 molecules of acetyl-CoA.
(c) requires 9 cycles of β -oxidation and produces 8 molecules of acetyl-CoA.

- (d) requires 9 cycles of β -oxidation and produces 9 molecules of acetyl-CoA.
32. () How is acetyl-CoA transported from the mitochondria to the cytosol for fatty acid synthesis? (a) directly as acetyl-CoA (b) through a temporary linkage to carnitine (c) as citric acid (d) There is no reason to transport acetyl-CoA from the mitochondria to the cytosol, since it is produced primarily in the cytosol
33. () The acyl carrier used in fatty acid synthesis is similar to coenzyme A.
(a) True (b) False
34. () ACP used in fatty acid synthesis is an abbreviation for (a) Acetyl-CoA phosphate. (b) Adenosine cyclo-phosphate. (c) Acyl Carnitine Protein (d) Acyl Carrier Protein.
35. () The ultimate precursor of all the carbon atoms in steroids is (a) acetyl-CoA (acetyl group) (b) oxaloacetate (c) succinyl-CoA (succinyl group) (d) α -ketoglutarate
36. () In nitrogen fixation, the chemical change is
(a) NH_4^+ to NO_2^- (b) NO_3^- to NH_4^+ (c) N_2 to NH_4^+ or NH_3 (d) NO_2^- to N_2
37. () Nitrification is the conversion of (a) nitrogen gas to nitrate. (b) nitrogen gas to ammonia. (c) nitrate to ammonia. (d) nitrate to nitrogen gas.
38. () Which of the following is correct? (a) The RNA structure is double helix. (b) An adenine-thymine base pair has three hydrogen bonds between the bases. (c) A complete turn of the B-DNA helix spans ten base, covering a distance of 34 Å. (d) Z-DNA is right-handed double helix structure.
39. () Which enzyme can carry out nick-translation? (a) DNA polymerase I. (b) DNA polymerase II. (c) DNA polymerase III. (d) Klenow fragment
40. () Which of the following statements is correct about the wobble hypothesis? (a) It is a non-Watson-Crick base pairing between two nucleotides in DNA molecules. (b) A tRNA can recognize only one codon. (c) The third base in a

- codon always forms a normal Watson-Crick base pair. (d) The “wobble” occurs only in the first base of the anticodon.
41. () In *E. coli*, rho-dependent transcription termination requires. (a) ρ protein hexamer plus ATP. (b) Inverted repeats A-T rich sequence. (c) Sigma factor. (d) RNA polymerase.
42. () Which of the following statements is not correct? (a) Enhancer is DNA sequence. (b) Silencer is a protein. (c) Promoter is DNA sequence. (d) Repressor is a protein.
43. () What is the Shine-Dalgarno sequence? (a) in eukaryotic cell complementary to 40S ribosomal RNA. (b) in eukaryotic cell complementary to 60S ribosomal RNA. (c) in prokaryotic cell complementary to 50S ribosomal RNA. (d) in prokaryotic cell complementary to 16S ribosomal RNA.
44. () Which of the following statements is true about the chaperon? (a) Chaperons are proteins. (b) A small molecule which stabilizes the correct folding of a protein. (c) Many chaperones are heat shock proteins. (d) All of the above.
45. () A coding sequence of DNA is TAG. The corresponding codon for the mRNA transcribed is (a) AUC. (b) UAG. (c) TAG. (d) AGU.
46. () Which of the following is not correct about trp operon? (a) Trp operon is an operon that codes for the components for production of tryptophan. (b) When tryptophan is present, the repressor is in its inactive conformation and cannot bind the operator region, so transcription is not inhibited by the repressor. (c) trp operon is autoregulation. (d) trp operon is regulated by transcription attenuation.
47. () A transcriptome is (a) three-dimensional mRNA structure. (b) a collection of all the genes being transcribed in a given cell or tissue. (c) mRNA transcribed to produce a fusion protein (d) a three-dimensional protein structure
48. () In three separate vessels, the plasmid X is treated with the restriction endonucleases *EcoRI*, *BamHI*, and *HindIII*. Which of the following best represents the electrophoretic gel one would see from these digests?



49. () Agarose and polyacrylamide gels are frequently used for electrophoresis, which of the following is True? (a) polyacrylamide gels could be used for huge DNA fragments separation (b) agarose gels could be used for huge DNA fragments separation (c) polyacrylamide gels are only used for protein electrophoresis. (d) Both of them could be used for 3-5 kbps DNA fragments separation
50. () The "c" in cDNA stands for this word (a) contamination (b) complete (c) concentration (d) complementary