



臺中健康暨管理學院
九十三年學年度碩士班招生考試試題紙

系所別	組別	考試科目	考試日期	時間	備註
生物科技學系碩士班	--	生物化學	93.5.3	10:30-12:10	共五頁

Multiple Choice Question (單選題): 2 points each

- Gel filtration chromatography is to separate the molecules based on the: (A) specific binding. (B) net charge. (C) size exclusion. (D) precipitation.
- To purify protein rich in Lysine residues, which of the following material should be used? (A) dextran (B) triton X-100 (C) diethylaminoethyl cellulose (D) carboxymethyl cellulose
- Which of the following is the simplest carbohydrate? (A) Glyceraldehyde (B) Fructose (C) Ribose (D) Maltose
- What is the major difference between genomic DNA and cDNA? (A) Nucleotide (B) exon (C) intron (D) None of the above
- Which of the following is the key material used in Sanger method to determine DNA sequence? (A) NTPs (B) rNTPs (C) dNTPs (D) ddNTPs
- The first dimensional separation in two-dimensional gel electrophoresis is to separate the molecule based on: (A) the size (B) the net charge (C) the structure (D) the affinity
- Which linkage is not in a glycogen molecule? (A) $\alpha(1\rightarrow4)$ (B) $\beta(1\rightarrow4)$ (C) $\alpha(1\rightarrow6)$ (D) None of the above
- Which of the following is not a polysaccharide? (A) Chitin (B) cellulose (C) pectin (D) lignin
- What is the first product during glycogen breakdown? (A) glucose-1-phosphate (B) glucose-6-phosphate (C) glucose (D) all of the above
- How many net ATP is gained from glycolysis beginning with glycogen breakdown? (A) 2 (B) 3 (C) 4 (D) 32
- Which molecule is involved in glycogen synthesis? (A) GTP (B) CTP (C) ATP (D) UTP
- The reactions in Cori cycle are: (A) gluconeogenesis in liver & glycolysis in muscle (B) gluconeogenesis in muscle & glycolysis in liver (C) gluconeogenesis in adipose tissue & glycolysis in liver (D) gluconeogenesis in liver & glycolysis in adipose tissue
- Which of the following is not the product for pentose phosphate pathway? (A) NADPH (B) NADH (C) CO_2 (D) sugar
- When the cell is in need for more energy, then: (A) bypassing the sugar generation stage of pentose phosphate pathway. (B) bypassing the oxidative stage of pentose phosphate pathway. (C) bypassing both the sugar generation and the oxidative stages of pentose phosphate pathway. (D) completing both the sugar generation and the oxidative stages of pentose phosphate pathway.
- What is the abbreviation for $CH_3(CH_2)_4CH=CH(CH_2)CH=CH(CH_2)_7COOH$? (A) 18:2 $\Delta 9,10,12,13$ (B) 18:2 $\Delta 9,12$ (C) 18:2 $\Delta 6,7,9,10$ (D) 18:2 $\Delta 6,9$

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16. Na/K pump is to transport:
- (A) Na outside of the cell & K inside of the cell.
 - (B) Na inside of the cell & K outside of the cell.
 - (C) both Na and K outside of the cell.
 - (D) both Na and K inside of the cell.
17. Ketone bodies will result in the decrease in blood acidity to:
- (A) increase the affinity of hemoglobin to O₂.
 - (B) decrease the affinity of hemoglobin to O₂.
 - (C) average out the affinity of hemoglobin to O₂.
 - (D) maintain the affinity of hemoglobin to O₂.
18. The main purpose of glyoxylate cycle is to generate oxaloacetate from acetyl CoA for:
- (A) TCA cycle in bacteria. (B) gluconeogenesis in plant.
 - (C) TCA cycle in animal. (D) gluconeogenesis in animal.
19. Which of the following is the shuttle mechanism for metabolite transport between mitochondria and cytosol during glycolysis in muscle?
- (A) glycerol-phosphate shuttle (B) pyruvate-oxaloacetate shuttle
 - (C) citrate-succinate shuttle (D) malate-aspartate shuttle
20. Continuing from the above question, how many net ATPs will be generated after one glucose molecule was oxidized completely to CO₂ and H₂O in muscle?
- (A) 26 (B) 28 (C) 30 (D) 32
21. Kozak sequence (ACCAUGG) is the sequence involved in the identification of translational initiation site. Using the genetic code provided, how many possible product will be produced from the nucleic acid sequence below?
- 5'-AUGCCAUAUAUCUAGUACCAUGGGUAGGCAUGAAUGUGACUGAUUUUAAGUAACAUA
AAUAAA
AA-3'
- (A) 1 (B) 2 (C) 3 (D) 4

UUU Phe	UCU Ser	UAU Tyr	CGU Arg
UUC Phe	UCC Ser	UAC Tyr	CCC Arg
UUA Leu	UCA Ser	UGU Cys	CGA Arg
UUG Leu	UCC Ser	UGC Cys	CGC Arg
CUU Leu	CCU Pro	CAU His	AGU Ser
CUC Leu	CCC Pro	CAC His	AGC Ser
CUA Leu	CCA Pro	CAA Gln	AGA Arg
CUG Leu	CCC Pro	CAG Gln	AGC Arg
AUU Ile	ACU Thr	AUU Asn	GGU Gly
AUC Ile	ACC Thr	AAC Asn	GGC Gly
AUA Ile	ACA Thr	AAA Lys	CGA Gly
AUG Met	ACG Thr	AAG Lys	GGC Gly
GUU Val	GCU Ala	GAU Asp	UGA SeCys
GUC Val	GCC Ala	GAC Asp	
GUA Val	GCA Ala	GAA Glu	
GUG Val	GCC Ala	GAG Glu	

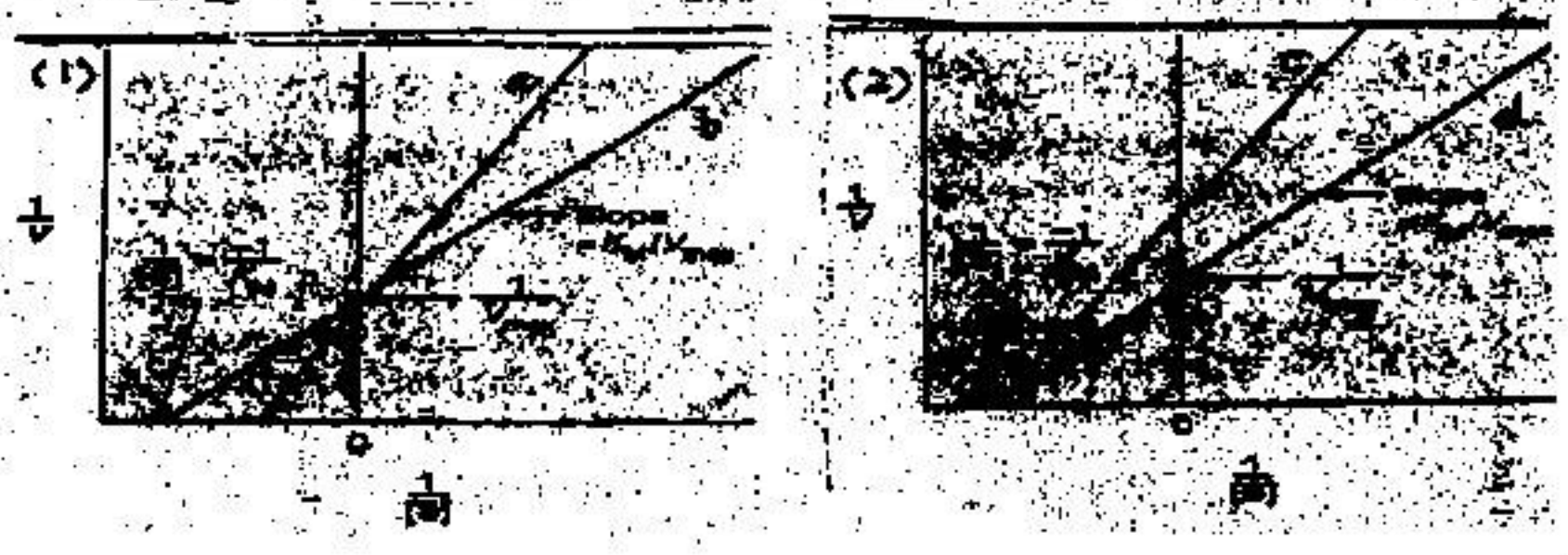
22. Continuing from the above question, which of the following is not included in either possible product?
- (A) Glycine (B) Cysteine (C) Valine (D) Lysine

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23. Which of the following is the precursor for purine biosynthesis?
 (A) Adenine (B) Hypoxanthine (C) Aminopterin (D) thymidine
24. enzyme k_M (mol/L) k_{cat} (s⁻¹)
- | | | |
|---|----------------------|-------------------|
| A | 1.5×10^{-2} | 0.14 |
| B | 3.0×10^{-4} | 0.50 |
| C | 9.0×10^{-4} | 7.6 |
| D | 7.9×10^{-3} | 7.9×10^2 |
- Which of the enzyme has higher substrate affinity?
 (A) A (B) B (C) C (D) D
25. Which lines are the inhibitor lines (with inhibitors) for Plot (1) and (2) below, respectively?
 (A) a, c (B) b, d (C) a, d (D) b, c



26. Which of the following is a DNA-binding domain?
 (A) Zn-finger (B) helix-turn-helix motif
 (C) basic region-leucine zipper (D) all of the above
27. The unusual property of Taq DNA polymerase is its:
 (A) ability to use dNTPs as substrate.
 (B) ability to use ddNTPs as substrate.
 (C) ability to use RNA as template.
 (D) thermostability
28. Which is the main enzyme for DNA replication in prokaryote?
 (A) DNA polymerase I (B) DNA polymerase II
 (C) DNA polymerase III (D) DNA polymerase IV
29. Which of the following can not be processed in prokaryotes?
 (A) DNA replication (B) gene transcription
 (C) mRNA translation (D) protein modification
30. Which is the common DNA form in cells?
 (A) A form (B) B form (C) C form (D) Z form
31. Which of the following statement about telomerase is not true?
 (A) Telomerase contains DNA complementary to the tolemere.
 (B) Telomerase uses its own RNA as the template to reverse-transcribe DNA.
 (C) Telomerase is not active in most adult tissues/cells.
 (D) Telomerase is active in rapidly growing tissues.
32. Which eukaryotic RNA polymerase is responsible for mRNA synthesis?
 (A) RNA polymerase I (B) RNA polymerase II
 (C) RNA polymerase III (D) RNA polymerase IV

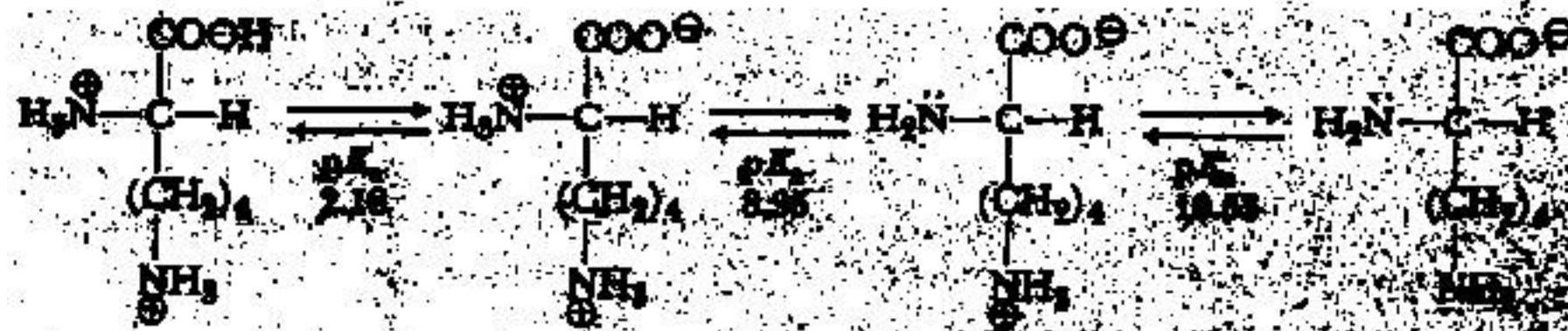


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33. What is the bond between nucleotides?
 (A) 5' to 3' phosphodiester bond (B) 3' to 5' phosphodiester bond
 (C) 5' to 2' phosphodiester bond (D) 2' to 5' phosphodiester bond
34. What is not the basic structure for a nucleoside?
 (A) ribose (B) phosphate (C) base (D) none of the above
35. Which subunit in RNA polymerase holoenzyme is responsible for the binding to the sense DNA?
 (A) α (B) β (C) ρ (D) σ
36. Which are the two subunits for prokaryotic ribosome?
 (A) 30S, 50S (B) 40S, 60S (C) 30S, 70S (D) 40S, 80S
37. What is the amino acid listed below?
 (A) Lysine (B) Arginine (C) Isoleucine (D) Valine



38. Continuing from the above question, what is the PI value for this amino acid?
 (A) 5.57 (B) 6.36 (C) 7.22 (D) 9.74
39. Which of the following is true about the difference between fatty acid degradation and biosynthesis?
 (A) Fatty acid degradation is in cytosol while its biosynthesis is in mitochondria.
 (B) Fatty acid degradation starts at carboxyl end while its biosynthesis starts at methyl end.
 (C) The final product for fatty acid degradation is propionyl CoA while the final product for its biosynthesis is acetyl CoA.
 (D) The malonyl-CoA is involved in the fatty acid degradation, but the malonyl-CoA is not involved in its biosynthesis.
40. Which of the following may not belong to promoter region?
 (A) operator (B) enhancer (C) TATA box (D) CAAT box
41. The mRNA maturation from pre-mRNA does not need to go through:
 (A) splicing (B) glycosylation (C) adenylation (D) capping
42. Which of the characteristic does not belong to eukaryotic DNA replication?
 (A) semi-conservative (B) semi-discontinuous
 (C) single origin of replication (D) 5' to 3' replication direction
43. During DNA replication, Okazaki fragments are formed on the:
 (A) lagging strand (B) leading strand
 (C) template strand (D) coding strand

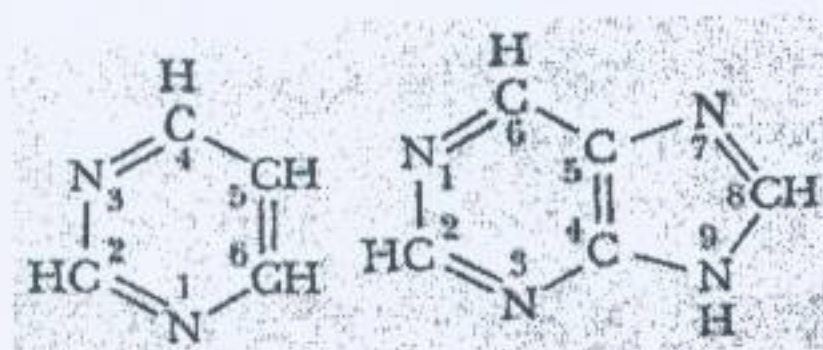
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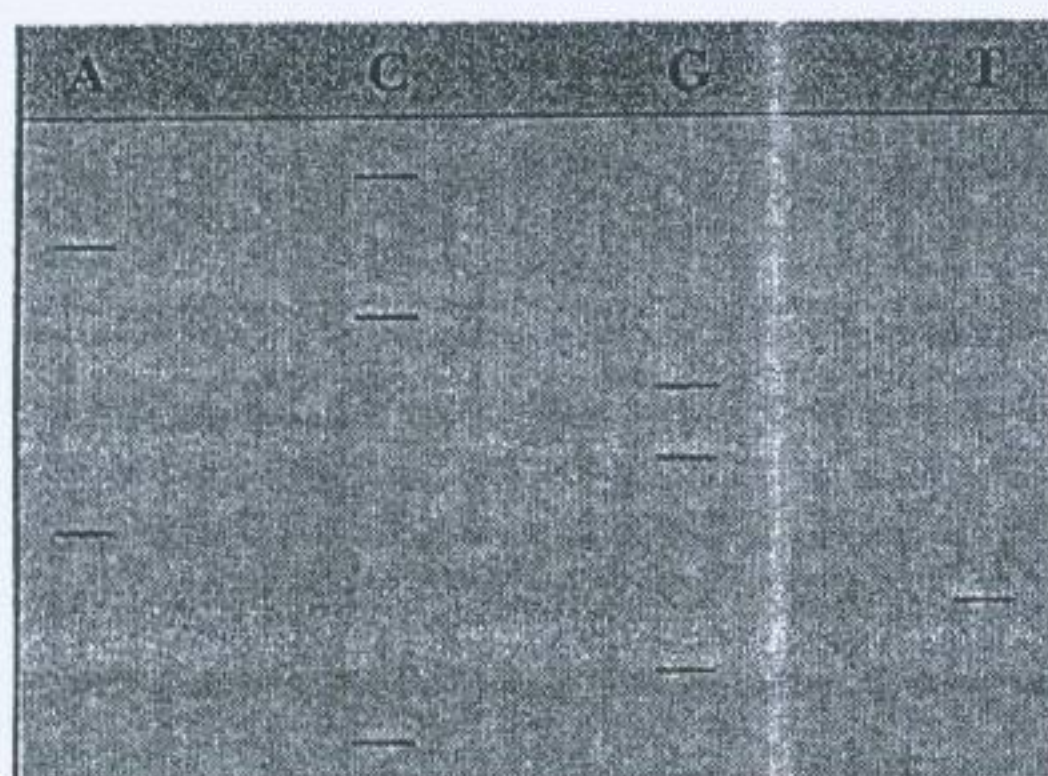
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44. During DNA replication, which primer is required on one of the strand?
 (A) DNA primer (B) RNA primer
 (C) both DNA and RNA primers (D) none of the above
45. If you need to track back your ancestors, which part of the DNA you should use?
 (A) father's mitochondrial DNA (B) mother's mitochondrial DNA
 (C) father's ribosomal DNA (D) mother's ribosomal DNA
46. The structures of purine and pyrimidine are shown below. The N atom at the position 1 of a purine molecule comes from:
 (A) glutamine (B) glycine (C) aspartate (D) tyrosine



47. Which of the following is the possible condition for each cycle of polymerase chain reaction?
 (A) 72°C, 1 min; 95°C, 1 min; 60°C 30 sec
 (B) 95°C, 1 min; 60°C, 30 sec; 72°C, 1 min
 (C) 60°C, 30 sec; 72°C, 1 min; 95°C, 1 min
 (D) all of the above
48. The photo shown below is the result of a DNA sequence gel using the Sanger method. Which of the following is the correct DNA sequence of the template strand?
 (A) 5' GTGCCTACG 3' (B) 5' GCATCCGTG 3'
 (C) 5' CGTAGGCAC 3' (D) 5' CACGGATGC 3'



49. Typtophan operon is regulated by:
 (A) allosteric regulation (B) feedback regulation
 (C) attenuation regulation (D) all of the above
50. When lactose concentration is high, lac operon is:
 (A) activated by dissociating from repressor protein.
 (B) activated by associating with repressor protein.
 (C) inhibited by dissociating from repressor protein.
 (D) inhibited by associating with repressor protein.