

科目：生物化學

適用：應化系

編號：485

考生注意：

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第 1 頁

一、單選題 (1-28 題，每小題 3 分，共計 84 分)

1. In glycoproteins the carbohydrate is most often linked to threonine, asparagine, or _____
 A) serine.
 B) lysine.
 C) valine.
 D) aspartic acid.
 E) tyrosine.
2. A major component of RNA but not of DNA is:
 A) uracil.
 B) cytosine.
 C) guanine.
 D) thymine.
 E) adenine.

The following question #3 refer to a table of codons.

		Second base of RNA codon					
		U	C	A	G		
First base of RNA codon	U	UUU — Phenylalanine (Phe) UUC — Phenylalanine (Phe) UUA — Leucine (Leu) UUG — Leucine (Leu)	UCU — Serine (Ser) UCC — Serine (Ser) UCA — Serine (Ser) UCG — Serine (Ser)	UAU — Tyrosine (Tyr) UAC — Tyrosine (Tyr) UAA — Stop UAG — Stop	UGU — Cysteine (Cys) UGC — Cysteine (Cys) UGA — Stop UGG — Tryptophan (Trp)	U	C
	C	CUU — Leucine (Leu) CUC — Leucine (Leu) CUA — Leucine (Leu) CUG — Leucine (Leu)	CCU — Proline (Pro) CCC — Proline (Pro) CCA — Proline (Pro) CCG — Proline (Pro)	CAU — Histidine (His) CAC — Histidine (His) CAA — Glutamine (Gln) CAG — Glutamine (Gln)	CGU — Arginine (Arg) CGC — Arginine (Arg) CGA — Arginine (Arg) CGG — Arginine (Arg)	U	C
	A	AUU — Isoleucine (Ile) AUC — Isoleucine (Ile) AUA — Isoleucine (Ile) AUG — Met or start	ACU — Threonine (Thr) ACC — Threonine (Thr) ACA — Threonine (Thr) ACG — Threonine (Thr)	AAU — Asparagine (Asn) AAC — Asparagine (Asn) AAA — Lysine (Lys) AAG — Lysine (Lys)	AGU — Serine (Ser) AGC — Serine (Ser) AGA — Arginine (Arg) AGG — Arginine (Arg)	U	C
	G	GUU — Valine (Val) GUC — Valine (Val) GUA — Valine (Val) GUG — Valine (Val)	GCU — Alanine (Ala) GCC — Alanine (Ala) GCA — Alanine (Ala) GCG — Alanine (Ala)	GAU — Aspartic acid (Asp) GAC — Aspartic acid (Asp) GAA — Glutamic acid (Glu) GAG — Glutamic acid (Glu)	GGU — Glycine (Gly) GGC — Glycine (Gly) GGA — Glycine (Gly) GGG — Glycine (Gly)	U	C
						U	C
						A	G
						G	G

3. What is the sequence of a peptide based on the following mRNA sequence, 5'-CUAUGCCUCUGAUUAGG-3'
 A) Met-Pro-Leu-Ile
 B) Leu-Cys-Leu-Tyr-Arg
 C) Met-Pro-Leu-Ile-Arg
 D) Leu-Cys-Leu

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- E) None of the above.
4. The major carrier of chemical energy in all cells is:
- A) Adenosine triphosphate.
 - B) Adenosine monophosphate.
 - C) Acetyl triphosphate.
 - D) Cytosine tetraphosphate.
 - E) Uridine diphosphate.
5. Which of the following is a DNA sequence?
- A) Silencer.
 - B) Repressor.
 - C) Activator.
 - D) Histon.
 - E) DNA binding domain.
6. Based on Chargaff's rules, which of the following are possible base compositions for double-stranded DNA?
- | | %A | %G | %C | %T | %U |
|----|--------------------|----|----|----|----|
| A) | 45 | 45 | 5 | 5 | 0 |
| B) | 20 | 20 | 20 | 20 | 20 |
| C) | 45 | 5 | 5 | 45 | 0 |
| D) | All of the above. | | | | |
| E) | None of the above. | | | | |
7. The nucleotide sequence that is complementary to 5'-TATAAA-3' is _____.
- A) 5'-AAATAT-3'
 - B) 5'-ATATTT-3'
 - C) 5'-TTTATA-3'
 - D) 5'-AAAUAU-3'
 - E) 5'-AUAUUU-3'
8. Proteins with charges can be separated by _____ chromatography.
- A) exclusion
 - B) size
 - C) ion exchange
 - D) affinity
 - E) gel
9. The macromolecules that serve in the storage and transmission of

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genetic information are:

- A) carbohydrates.
- B) lipids.
- C) nucleic acids.
- D) membranes.
- E) proteins.

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10. A gene contains two 100 bp introns and three 50 bp exons. About how long is the mature RNA transcribed from this gene?

- A) 100 bp.
- B) 150 bp.
- C) 200 bp.
- D) 250 bp.
- E) 300 bp.

問

11. SDS/polyacrylamide gel electrophoresis separates proteins based on

- A) size of the polypeptide chain.
- B) net charge of the native protein.
- C) net charge of the denatured protein.
- D) all of the above
- E) none of the above.

12. Starch and glycogen are both polymers of:

- A) D-glucose.
- B) glucose 1-phosphate.
- C) sucrose.
- D) fructose.
- E) Amino-acid.

試

13. The three dimensional structures of a protein is maintained by

- A) disulfide linkages.
- B) hydrophobic bonds.
- C) hydrogen bonds.
- D) ionic bonds.
- E) all of the above.

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14. In living cells, nucleotides and their derivatives can serve as:

- A) carriers of metabolic energy.
- B) enzyme cofactors.
- C) intracellular signals.

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- D) precursors for nucleic acid synthesis.
E) all of the above.
15. What are the characteristics of proteins that are used for separation by 2-D gel electrophoresis in the first and second dimension respectively?
- A) Affinity/charge.
 - B) Mass/affinity.
 - C) Mass/charge.
 - D) Shape/charge.
 - E) PI/mass.
16. Proteins with charges can be separated by _____ chromatography.
- A) exclusion
 - B) affinity
 - C) gas
 - D) high pressure liquid
 - E) ion exchange
17. Restriction enzymes:
- A) act at the membrane to restrict the passage of certain molecules into the cell.
 - B) are highly specialized ribonucleases that degrade mRNA soon after its synthesis.
 - C) are sequence-specific DNA endonucleases.
 - D) are very specific proteases that cleave peptides at only certain sequences.
 - E) catalyze the addition of a certain amino acid to a specific tRNA.
18. In eukaryotes the enzymes of the citric acid cycle are found in the _____.
- A) cytosol.
 - B) nucleus.
 - C) mitochondria.
 - D) endoplasmic reticulum.
 - E) Golgi complex.
19. A fatty acid designated as 20:0 is _____, while one that is designated 20:3^{Δ5,8,11} is _____.
- A) simple lipid; complex lipid

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- B) complex lipid; simple lipid
C) saturated lipid; unsaturated lipid
D) unsaturated lipid; saturated lipid
E) monounsaturated; polyunsaturated

20. Which the fatty acid that has the higher melting temperature?

- A) 16:0
B) 18:0
C) 18:1^{Δ9}
D) 18:2^{Δ9,12}
E) 18:3^{Δ6,9,12}

21. Programmed cell death is called:

- A) metastasis.
B) apoptosis.
C) mitotic termination.
D) oncogenic transformation.
E) ubiquitination.

22. The term "proteome" has been used to describe:

- A) regions (domains) within proteins.
B) the complement of proteins encoded by an organism's DNA.
C) regularities in protein structures.
D) the structure of a protein-synthesizing ribosome.
E) the tertiary structure of a protein.

23. Protein structural motifs often have general functions in common.

Which one of the following motifs is known to be involved in protein dimer formation, but not in direct protein-DNA interactions?

- A) β-barrel.
B) helix-turn-helix.
C) homeodomain.
D) leucine zipper.
E) zinc finger.

24. Phosphate groups are usually added to enzymes by a _____ using _____.

- A) phosphorylase, ADP
B) kinase, ADP
C) synthase, creatine phosphate
D) kinase, ATP

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E) one of the above

25. Those proteins least likely to contain disulfide bonds are those
- A) found in the cell membrane because of the exposure to the cell's surroundings.
 - B) that fold into the interior of the three-dimensional shape away from water.
 - C) that are exposed to oxidizing agents produced by cells.
 - D) that contain cystine within the molecular structure.
 - E) None of the other answers is correct.

26. A technique that is used to determine the abundance of a particular mRNA is

- A) gel shift assay
- B) dideoxy chain termination
- C) Southern blotting
- D) Northern blotting
- E) Western blotting

27. How much volume of the stock solution with 50 mM is required to add to a petridish with 10 ml medium when 250 μ M of final solution is desired?

- A) 0.05 μ l
- B) 0.5 μ l
- C) 5 μ l
- D) 50 μ l
- E) 500 μ l

28. 18% of glucose (MW=180) is equivalent to

- A) 100 M
- B) 10 M
- C) 1 M
- D) 0.1 M
- E) 0.01 M

二、名詞解釋 (29-32題，每小題4分，共計16分)

29. Enzyme

30. Reverse transcription

31. Affinity chromatography

32. Polymerase chain reaction (PCR)