

本試題第 1 頁；共 5 頁
(如有缺頁或毀損，應立即請監試人員補發)

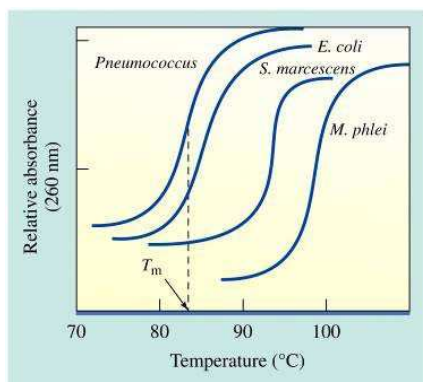
6. In eukaryotic cells, RNA polymerase ____ transcribes most of the ribosomal RNA, RNA polymerase ____ transcribes the major structural genes and RNA polymerase ____ transcribes tRNAs.

Ⓐ I; II; III Ⓑ III; II ; I Ⓒ II; I; III Ⓓ I; III; II

7. In glycoproteins, the carbohydrate moiety is always attached through the amino acid residues:

Ⓐ asparagine, serine, or threonine
Ⓑ aspartate or glutamate
Ⓒ glycine, alanine, or aspartate
Ⓓ tryptophan, aspartate, or cysteine

8. Melting curves for DNA molecules from four microorganisms (with the same genome size), these are obtained by heating DNA solutions and measuring the absorbance changes at 260nm. Which organism with the higher G+C content of DNA?



- ☐ A *M. phlei* ☐ B *Pneumococcus* ☐ C *E. coli* ☐ D *S. marcescens*
9. In the laboratory, recombinant plasmids are commonly introduced into bacterial cells by:
- ☐ A electrophoresis – a gentle low-voltage gradient draws the DNA into the cell
☐ B infection with a bacteriophage that carries the plasmid
☐ C microinjection
☐ D transformation – heat shock of the cells incubated with plasmid DNA in the presence of CaCl_2
10. Which of the conditions would result in the least amount of transcription of the *lac* operon?
- | | [glucose] | [lactose] |
|------|-----------|-----------|
| I. | high | high |
| II. | low | low |
| III. | high | low |
| IV. | low | high |
- ☐ A I ☐ B II ☐ C III ☐ D IV
11. Which of the following is a DNA sequence?
- ☐ A operator ☐ B activator ☐ C repressors ☐ D transactivators
12. An Okazaki fragment is a:
- ☐ A fragment of DNA resulting from endonuclease action
☐ B segment of DNA that is an intermediate in the synthesis of the lagging strand
☐ C piece of DNA that is synthesized in the 3' to 5' direction
☐ D segment of mRNA synthesized by RNA polymerase
13. Steroid hormone response elements (HREs) are _____, which, when bound to _____, alter gene expression at the level of _____.
- ☐ A intron sequences; activated hormone receptor; translation
☐ B nuclear proteins; hormone; transcription
☐ C sequences in DNA; receptor-hormone complex; transcription
☐ D sequences in DNA; receptor-hormone complex; replication
14. Which mechanism is not used to repair a thymidine dimer in DNA damage?
- ☐ A mismatch repair ☐ B base-excision repair ☐ C nucleotide-excision repair ☐ D direct repair
15. Assuming that the average amino acid residue contributes 110 to the peptide molecular weight, what will be the minimum length of the mRNA encoding a protein of molecular weight 55,000?
- ☐ A A minimum length cannot be determined from the data given
☐ B 550 nucleotides
☐ C 500 nucleotides
☐ D 1,500 nucleotides

16. Enzymes are biological catalysts that enhance the rate of a reaction by:
- Ⓐ decreasing the activation energy Ⓑ decreasing the amount of free energy released
Ⓒ increasing the activation energy Ⓓ increasing the energy of the transition state
17. In a highly basic solution, pH = 13, the dominant form of glycine is:
- Ⓐ $\text{NH}_2\text{—CH}_2\text{—COO}^-$ Ⓑ $\text{NH}_2\text{—CH}_3^+\text{—COO}^-$ Ⓒ $\text{NH}_3^+\text{—CH}_2\text{—COOH}$ Ⓓ $\text{NH}_3^+\text{—CH}_2\text{—COO}^-$
18. At the isoelectric pH of a tetrapeptide:
- Ⓐ only the amino and carboxyl termini contribute charge
Ⓑ the amino and carboxyl termini are not charged
Ⓒ the total net charge is zero
Ⓓ two internal amino acids of the tetrapeptide cannot have ionizable R groups
19. Which of the following parts of the IgG molecule are not involved in binding to an antigen?
- Ⓐ Fab Ⓑ Fc Ⓒ heavy chain Ⓓ light chain
20. How is trypsinogen converted to trypsin?
- Ⓐ A protein kinase-catalyzed phosphorylation converts trypsinogen to trypsin.
Ⓑ Cleavage of trypsinogen forms trypsin.
Ⓒ Trypsinogen dimers bind an allosteric modulator, cAMP, causing dissociation into active trypsin monomers.
Ⓓ Two inactive trypsinogen dimers pair to form an active trypsin tetramer.
21. Starch and glycogen are both polymers of:
- Ⓐ fructose Ⓑ sucrose Ⓒ α -D-glucose Ⓓ β -D-glucose
22. A major component of RNA but not of DNA is:
- Ⓐ adenine Ⓑ guanine Ⓒ thymine Ⓓ uracil
23. Which of the following is a palindromic sequence?
- Ⓐ AGGTCC Ⓑ CCTTCC Ⓒ GAATCC Ⓓ GGATCC
TCCAGG GCAAGG CTTAGG CCTAGG
24. Which of the following deoxyoligonucleotides will hybridize with a DNA containing the sequence 5'-AGACTGGTC-3'?
- Ⓐ 5'-CTCATTGAG-3' Ⓑ 5'-GACCAGTCT-3' Ⓒ 5'-GAGTCAACT-3' Ⓓ 5'-TCTGACCAG-3'
25. Which vitamin is derived from cholesterol?
- Ⓐ A Ⓑ D Ⓒ E Ⓓ K
26. Integrins are:
- Ⓐ membrane proteins that are involved in ion transport
Ⓑ membrane proteins that are involved in sugar transport
Ⓒ membrane proteins that mediate cell adhesion
Ⓓ proteins that are found at the membrane-cytoplasm interface
27. The fluidity of the lipid side chains in the interior of a bilayer is generally increased by:
- Ⓐ a decrease in temperature
Ⓑ an increase in fatty acyl chain length
Ⓒ an increase in the number of double bonds in fatty acids
Ⓓ an increase in the percentage of phosphatidyl ethanolamine
28. Movement of water across membranes is facilitated by proteins called:
- Ⓐ annexins Ⓑ aquaporins Ⓒ hydropermeases Ⓓ selectins

29. Hormone-activated phospholipase C can convert phosphatidylinositol 4,5-bisphosphate to:
- Ⓐ diacylglycerol + inositol triphosphate
 - Ⓑ diacylglycerol + inositol+ phosphate
 - Ⓒ glycerol + inositol + phosphate
 - Ⓓ glycerol + phosphoserine
30. Biological oxidation-reduction reactions always involve:
- Ⓐ direct participation of oxygen
 - Ⓑ formation of water
 - Ⓒ transfer of electron(s)
 - Ⓓ transfer of hydrogens
31. Which of the following molecules is not an intermediate of the citric acid cycle?
- Ⓐ acetyl-coA
 - Ⓑ citrate
 - Ⓒ oxaloacetate
 - Ⓓ succinyl-coA
32. Which of the following molecules is able to cross the inner mitochondrial membrane?
- Ⓐ acetyl-CoA
 - Ⓑ fatty acyl-carnitine
 - Ⓒ fatty acyl-CoA
 - Ⓓ malonyl-CoA
33. When comparing the β -oxidation and ω -oxidation pathways, which one of the following statements is correct?
- Ⓐ β -oxidation and ω -oxidation occur in the cytoplasm.
 - Ⓑ β -oxidation occurs at the carboxyl end of the fatty acid whereas ω oxidation occurs at the methyl end.
 - Ⓒ β -oxidation occurs at the methyl end of the fatty acid whereas ω oxidation occurs at the carboxyl end.
 - Ⓓ β -oxidation occurs mainly in the cytoplasm whereas ω oxidation occurs mainly in the mitochondria.
34. The human genetic disease phenylketonuria (PKU) can result from:
- Ⓐ deficiency of protein in the diet
 - Ⓑ inability to catabolize ketone bodies
 - Ⓒ inability to convert phenylalanine to tyrosine
 - Ⓓ inability to synthesize phenylalanine
35. Which of these can be synthesized by plants but not by humans?
- Ⓐ linoleate [$18:2(\Delta^{9,12})$]
 - Ⓑ palmitate (16:0)
 - Ⓒ pyruvate
 - Ⓓ stearate (18:0)
36. The hormones epinephrine and norepinephrine are derived biosynthetically from:
- Ⓐ arginine
 - Ⓑ isoleucine
 - Ⓒ tryptophan
 - Ⓓ tyrosine
37. Nonessential amino acids:
- Ⓐ are amino acids other than those required for protein synthesis
 - Ⓑ are not utilized in mammalian proteins
 - Ⓒ are synthesized by plants and bacteria, but not by humans
 - Ⓓ can be synthesized in humans as well as in bacteria
38. Histones are_____ that are usually associated with_____.
- Ⓐ acidic proteins; DNA
 - Ⓑ acidic proteins; RNA
 - Ⓒ basic proteins; DNA
 - Ⓓ basic proteins; RNA
39. The Ames test is used to:
- Ⓐ detect bacterial viruses
 - Ⓑ determine the rate of DNA replication
 - Ⓒ examine the potency of antibiotic
 - Ⓓ measure the mutagenic effects of various chemical compounds
40. Aptamers are:
- Ⓐ double-stranded RNA products of nuclease action on hairpin RNAs
 - Ⓑ repeat sequence elements at the ends of transposons
 - Ⓒ small RNA molecules selected for tight binding to specific molecular targets
 - Ⓓ the RNA primers required for retroviral replication

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生物化學試題

本試題第 5 頁；共 5 頁
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二、Match the correct answer at the left with a related terminology at right. Only one answer will be the most direct for each. (20%, 2points/each)

1. Spliceosome	A	The multiple sequences (such as replication origins) that allow their autonomous replication in two or more hosts
2. Proteasome	B	In bacteria, the nuclear zone that contains the chromosome but has no surrounding membrane
3. Peptidyl transferase	C	In eukaryotic cells, a densely staining structure in the nucleus; involved in rRNA synthesis and ribosome formation
4. Nucleoids	D	A sequence in an mRNA that is required for binding bacterial ribosomes
5. Ubiquitin	E	A structured segment of an mRNA that binds to a specific ligand and affects the translation or processing of the mRNA
6. Shine-Dalgarno sequence	F	Supramolecular assembly of enzymatic complexes that function in the degradation of damaged or unneeded cellular proteins
7. Shuttle vectors	G	A protein that tags another protein for proteolysis
8. Peptidoglycan	H	A vector for DNA sequencing
9. Attenuator	I	A ribozyme, part of the rRNA of the large ribosomal subunit
10. miRNA	J	The structural component of bacterial cell wall
	K	An enzyme complex that synthesizes the primers required for lagging strand DNA synthesis
	L	An RNA sequence involved in regulating the expression of certain genes; functions as a transcription terminator
	M	An enzyme that causes a movement such as the movement of a ribosome along an mRNA
	N	The extracellular matrix of animal tissues
	O	A class of small RNA molecules involved in gene silencing by inhibiting translation and/or promoting the degradation of particular mRNAs
	P	A complex of RNAs and proteins involved in the splicing of mRNAs in eukaryotic cells