所別：生物資訊與系統生物研究所碩士班 科目：生物化學

Part I. (55%)

解釋名詞: (5 points each)

1. ribozyme
2. catabolism vs. anabolism
3. glycolysis
4. β-oxidation
5. phospholipid

填充題: (每格 2 分) (English answer only)

1. The major fuel depots are _____ at adipose tissue and _____ in muscle and liver.
2. The key hormone regulating fuel metabolism is _____, which promotes glucose use and _____, which increase blood glucose

3. Please list one cofactor for enzyme catalysis: _____

單選題: (每題 2 分):

1. The average amino acid residue weight in a protein of typical composition is about
1) 120 daltons 2) 1200 daltons 3) 120 mg 4) 120 ng

2. An enzyme that catalyze the reaction changes the
1) entropy of the reaction
2) equilibrium constant
3) heat of reaction
4) rate of the reaction

3. Which of the following takes place during oxidative phosphorylation in mitochondria:
1) Electrons are pumped from the intermembrane space to the matrix
2) Electrons are pumped from the matrix to the intermembrane space
3) Protons are pumped from the intermembrane space to the matrix
4) Protons are pumped from the matrix to the intermembrane space

4. ATP is synthesized by _____ routes.
1) substrate-level phosphorylation
2) oxidative phosphorylation

注意：背面有試題

3) photophosphorylation
4) all of above

5. Which of the following types of bonds or interactions are least likely to be involved in stabilizing the three-dimensional folding of most proteins?
1) Disulfide bonds 2) Hydrogen bonds
3) Hydrophobic interactions 4) Ester bonds

6. Approximately how many moles of ATP will be generated as result of the oxidation of one more of $NADH_2$ in an actively respiring mitochondria?
1) 0 2) 2 3) 3 4) 6

7. The citric acid cycle is controlled primarily by the relative intramitochondrial concentrations of
1) NAD^+ and NADH
2) acetyl-Co and pyruvate
3) $NADP^+$ and NADPH
4) FAD and FADH

8. The _____ is a central pathway for the oxidation of carbohydrates, lipids and proteins.
1) citric acid cycle
2) gluconeogenesis
3) electron transport chain
4) glycolysis

9. Which of the following enzymes does not use O_2 as substrate
1) oxygenase
2) oxidase
3) hydroxylase
4) all of above

10. The biological reduction of nitrogen to form ammonia is called
1) ammonia formation
2) Harber process
3) nitrogen fixation
4) nitrogen metabolism

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Part II Single Choice (Total 45%):

1. Which of the following is **NOT** involved in the processing of mRNA precursors in eukaryotic cells?
   (A) Capping of the 5' end
   (B) Splicing of exons
   (C) Addition of poly A
   (D) Excision of introns
   (E) Transport of the pre-mRNA to the cytoplasm

2. RNA molecules that exhibit catalytic activity are called
   (A) Ribozymes
   (B) Ribonucleotides
   (C) mRNAs
   (D) Ribonucleases
   (E) Ribosomes

3. Which of the following is true about a circular double-stranded DNA genome that is determined by chemical means to be 21% adenosine?
   (A) The genome is 10.5% guanosine
   (B) The genome is 21% guanosine
   (C) The genome is 29% guanosine
   (D) The genome is 58% guanosine
   (E) The base percent composition of guanosine in the genome cannot be determined from the information given

4. All of the following contribute to promoter binding by RNA polymerase in *E. coli* **EXCEPT** the
   (A) -10 consensus sequence
   (B) -35 consensus sequence
   (C) β subunit of RNApolymerase
   (D) β' subunit of RNA polymerase
   (E) Rho factor

5. The ribosome is involved in all of the following **EXCEPT**
   (A) Peptide bond formation
   (B) Binding of protein factors during elongation
   (C) Binding of aminoacyl tRNa to mRNA
   (D) Bidning of mRNA at an initiation codon
   (E) Aminoacylation of tRNA

6. The specialized structures located at the ends of eukaryotic chromosomes are called
   (A) Terminators
   (B) Telomeres
   (C) Long terminal repeats (LTR's)
   (D) Centromeres
   (E) Kinetochores

7. Common lesions found in DNA after exposure to ultraviolet light are
   (A) Single strand breaks
   (B) Pyrimidine dimmers
   (C) Base deletions
   (D) Purine dimmers
   (E) Transpositions

注意：背面有試題

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Questions 6-11 refer to the following cell components in mammalian cells

(A) Nuclear envelope
(B) Nucleolus
(C) Nuclear lamina
(D) Euchromatin
(E) Heterochromoatin

8. Site of synthesis of histone mRNA

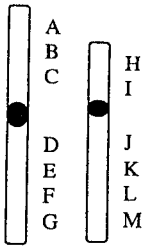
9. Site of transcriptionally inactive DNA

10. Site of protein synthesis

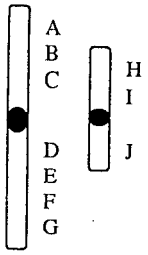
11. Site of transcription by RNA polymerase II

Questions 12-15 refer to the following schematic diagram of two normal chromosomes and five aberrant forms (A through E) of those chromosomes. (circles represent centromeres and letters represent genetic loci.)

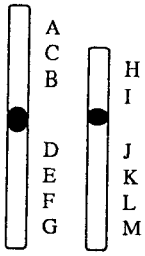
Normal chromosomes



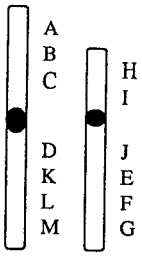
(A)



(B)



(C)



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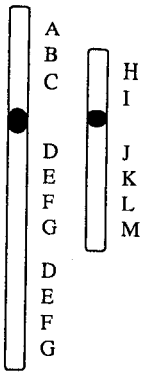
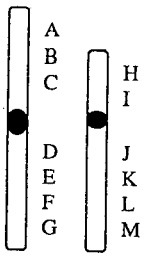


(E)



12. Deletion

13. Duplication

14. Inversion

15. Reciprocal translocation