所別：生物資訊與系統生物研究所碩士班 一般生 科目：生物化學

Part I: (Total 50%)

I. 是非題 (2 points each, 20%)

1. Proteins absorb UV light.
2. DNA absorbs UV light.
3. RNA absorbs UV light.
4. Glycolysis only occurs only at aerobic condition.
5. β-oxidation occurs only at aerobic condition.
6. Respiration occurs only at aerobic conditon.
7. photosynthesis is involved in oxidative phosphorylation.
8. Fermentation is involved in oxidative phosphorylation.
9. Km is the affinity of the substrate to its enzyme
10. One gene has only one protein product

II.解釋名詞: (5 points each, 30%)

1. Enzyme cofactor
2. Anabolism vs. catabolism
3. Glycolysis
4. Phospholipid
5. Citric acid cycle
6. β-oxidation

Part II Single Choice (Total 50%, each 2.5%):

1. Ribosome is responsible for protein synthesis. Which part of ribosome has the major activity to link amino acid to peptide chain?
   (A) 16S rRNA
   (B) 5S rRNA
   (C) Large ribosomal proteins
   (D) Small ribosomal proteins
   (E) 23S rRNA
2. Which of the following description is **TRUE**?
   (A) Eukaryotic transcription occurs in cytosol
   (B) Eukaryotic DNA replication occurs in the cytosol
   (C) Prokaryotic transcription occurs in the nucleus
   (D) Prokaryotic DNA replication occurs in the nucleus
   (E) Prokaryotic translation occurs in the cytosol
3. Which of the following description is **NOT TRUE**?
   (A) Eukaryotic transcripts contain poly A tail
   (B) Eukaryotic genes contain introns
   (C) Eukaryotic transcripts contain introns
   (D) Prokaryotic transcripts do not contain introns
   (E) Prokaryotic transcripts contain more than one gene sequence
4. A hydrophobic protein is most likely to have the highest proportion of which of the following amino acid residues buried within its core?
   (A) Arginine (B) Isoleucine (C) Leucine (D) Valine (E) Glycine (F)Alanine
5. Which of the following description is **TRUE**?
   (A) EF-Tu carries tRNA to P site of ribosome
   (B) EF-Tu carries tRNA to A site of ribosome
   (C) EF-Tu recharge EF-Ts with GTP
   (D) EF-Tu facilitates translocation
   (E) EF-Ts facilitates translocation

注意：背面有試題

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6. Which of the following ion is required for polymerase chain reaction?
   (A) Ca^{2+} (B) Na^{+} (C) K^{+} (D) Mg^{2+} (E) Li^{+}
7. Which of the following description is **NOT TRUE**?
   (A) Eukaryotic mRNA is synthesized by RNA polymerase II
   (B) TFIIH is required to unwind DNA
   (C) TFIIH is required to phosphorylate C-terminal domain of RNA polymerase II
   (D) TFIID is required for the binding of promoter
   (E) TFIID is required to unwind DNA
8. An *E. coli* strain lacking RecA would be deficient in
   (A) Transcription (B) Translation (C) DNA repair (D) Splicing (E) Degradation
9. The reason for that plant genome is normally larger than human genome is more likely due to
   (A) DNA duplication (B) DNA deletion (C) DNA methylation
   (D) DNA repair (E) DNA translocation
10. Gene Z contains a lysine residue that is important for binding to DNA. Which mutations would be predicted to be the most harmful to the ability of gene Z to bind DNA?
    (A) Arginine (B) Glycine (C) Valine (D) Glutamate (E) Histidine
11. Which of the following description about nucleotides excision repair is **TRUE**?
    (A) Damaged nucleotides are removed by nick translation
    (B) DNA ligase catalyzes the final reaction
    (C) Deficiency of this enzyme in humans greatly increases the risk of skin cancer
    (D) The first enzyme in this pathway cleaves two phosphodiester bonds
    (E) All above

Questions 12, 13 refer to the following descriptions.
(A) GC rich (B) AT rich (C) AC rich (D) TG rich (E) GG rich

12. Which is a common characteristic of replication origin sequences?
13. Which is a common characteristic of promoter sequences?

Questions 14-17 refer to the following enzymes.
(A) DNA polymerase δ
(B) DNA polymerase α
(C) DNA ligase
(D) DNA helicase
(E) Topoisomerase

14. Which enzyme is required to link two Okazaki fragments?
15. Which enzyme is required to unwind double-stranded DNA?
16. Which enzyme has proofreading function?
17. Which enzyme is required to initiate replication

Questions 18-20 refer to the following sequences.
Genomic sequence of gene X is
5'GGCTGATGCCAATCGCCGAATTGTACTGAACC-3'.
(A) 5'-CCGACTACGGTTAGCGGCTTAACATGACTTGG-3'
(B) 5'-GGTTCAGTACAATTCGGCGATTGGCATCAGCC-3'
(C) 5'-CCGACUACGGUUAGCGGCUUAACAUGACUUGG-3'
(D) 5'-GGCUGAUGCCAAUCGCCGAAUUGUACUGAACC-3'
(E) 5'- GGUUCAGUACAAUUCGGCGAUUGGCAUCAGCC-3'

18. Which sequence is DNA template for RNA transcription?
19. Which sequence is gene transcript?
20. Which sequence is