

國立臺北科技大學

九十四學年度生物科技研究所入學考試

分子生物學試題

填准考證號碼

第一頁 共二頁

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注意事項：

1. 本試題共 8 題，配分共 100 分。
2. 請按順序標明題號作答，不必抄題。
3. 全部答案均須答在答案卷之答案欄內，否則不予計分。

(一) Define the terms (30%)

- (1) melting temperature of DNA (2) plasmid (3) repressor (4) inhibitor
 (5) RNA splicing (6) glycoprotein (7) restriction enzyme (8) phage
 (9) hybridoma (10) antioncogene

(二) 複選題 (答錯不倒扣) (30%)

- (1) 下列有關 tetracycline 為 antibiotic 的機制，何者正確？
 (A) It blocks elongation of translation (B) It blocks termination of translation
 (C) It blocks elongation of transcription (D) It blocks termination of transcription
 (E) It inhibits peptidyl transferase
- (2) 下列何者為 RNA virus?
 (A) HIV (B) baculovirus (C) polio virus (D) influenza (E) SARS coronavirus
- (3) 下列 enzyme 何者參與 DNA replication?
 (A) permease (B) DNA polymerase (C) RNA polymerase (D) primase (E) helicase
- (4) 有關 immune system 的敘述，下列何者正確？
 (A) An immunoglobulin G molecule is bivalent.
 (B) Each B cell produces its own particular antibody molecules.

- (C) In the bone marrow, any B cell that binds an antigen is eliminated.
- (D) B cells cannot produce secreted antibodies until activated by a killer T cell.
- (E) Cytotoxic T cells contain MHC II proteins.
- (5) 有關 translation 的敘述，下列何者正確？
- (A) The start site is the AUG or less frequently GUG.
- (B) The Shine-Dalgarno sequence is ribosome binding site.
- (C) A ribosome contains RNAs and proteins.
- (D) The tRNA molecules have an anticodon and an amino acid accepting site.
- (E) There is no Shine-Dalgarno sequence in the eukaryotic messenger RNA.
- (6) 有關 DNA structure 的敘述，下列何者正確？
- (A) Single-stranded DNA has equal numbers of adenine and thymine residues.
- (B) Double-stranded DNA has equal numbers of guanine and cytosine residues.
- (C) Double-stranded DNA chains are antiparallel.
- (D) Helix rise per base pair in B form DNA is 0.34 nm.
- (E) At high humidity, B form DNA undergoes a reversible transformation to A form DNA.
- (7) 已知下列 double-stranded DNA 序列
..A TGGCTACCT . promoter
上述之 promoter 爲此基因之 promoter。試寫出此基因之 mRNA
(A) AUGGCUACCU. (B) UCCAUCGGUA. (C) UACCGAUGGA.
(D) AGGUAGCCAU. (E) TACCGATGGA
- (8) 有關 human genomics 的敘述，下列何者正確？
- (A) The size of human genome is about 3.2 billion base pairs.
- (B) The human genome contains about 25,000-40,000 genes.
- (C) Functional genomics is the study of all DNA in an organism.
- (D) Single-nucleotide polymorphism can account for many genetic condition caused by single genes.
- (E) The sum of all RNAs produced by an organism is its transcriptomics.
- (9) 有關 jumping genes 的敘述，下列何者正確？
- (A) Transposons are pieces of DNA that can move from one site to another.
- (B) Retrotransposons replicate through an RNA intermediate.
- (C) Translocase is the enzyme to catalyses the transposition event.
- (D) Some transposable elements replicate and others transpose without replication.
- (E) The existence of jumping genes was first detected by Francis Crick.

(10) 有關 gene 的敘述，下列何者正確？

- (A) Genes can exist in several different forms called alleles.
- (B) Most genes exist in linear array on chromosomes.
- (C) All genes are made of double-stranded DNA
- (D) The process of making a gene product is called gene regulation.
- (E) A recessive allele can be masked by a dominant one in a heterozygote.

(三) 請寫出執行 PCR 所需之物質。(5%)

(四) 今年二月，聯合國通過聲明文，主張禁止任何形式的人類複製，包括了醫療複製及生殖複製。請問何謂醫療複製？何謂生殖複製？(5%)

(五) What is hapten? (4%)

(六) 試比較 prokaryotic 和 eukaryotic mRNA 的異同。(6%)

(七) 在 medium 中，同時存在 glucose 和 lactose。請問 *E. coli* 會優先使用那一個？請詳細說明原因。(10%)

(八) 請說明 two-dimensional gel electrophoresis 的原理。(10%)