

臺北醫學大學 101 學年度碩士班暨碩士在職專班招生入學考試

分子生物學試題

本試題第 1 頁；共 2 頁

(如有缺頁或毀損，應立即請監試人員補發)

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項 | 一、本試題共三大題，共計 100 分。
二、請將最適當的答案依題號作答於答案用卷本上。
三、試題答錯者不倒扣；題次號碼錯誤或不按順序或鉛筆作答，不予計分。 |
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一、選擇題：(每題 2%，共 14%)

- Histones are _____ that are usually associated with _____.
(A) acidic proteins; DNA (B) acidic proteins; RNA (C) basic proteins; DNA
(D) basic proteins; RNA (E) coenzymes derived from histidine; enzymes
- Topoisomerases can:
(A) change the linking number (Lk) of a DNA molecule. (B) change the number of base pairs in a DNA molecule.
(C) change the number of nucleotides in a DNA molecule. (D) convert D isomers of nucleotides to L isomers.
(E) interconvert DNA and RNA.
- At which phase of cell cycle, the cell contains $4n$ DNA?
(A) G1 (B) S (C) G2
(D) M (E) none of the above
- Protein function can be regulated by sumoylation or phosphorylation. We call this situation as:
(A) transcriptional control (B) posttranscriptional control
(C) translational control (D) posttranslational control
(E) none of the above
- Protein expression is an important parameter monitoring gene's function. One of the following techniques is **NOT** used in studying proteins:
(A) ELISA (B) Western blot analysis (C) HPLC
(D) FISH (E) 2-dimensional electrophoresis
- The restriction fragment length polymorphism (RFLP) is used to analyze
(A) different DNA sequence (B) different RNA sequence
(C) different protein sequence (D) none of the above
- Which technique **CAN BE** used to "knock down" gene expression?
(A) RNA interference (B) Southern blot (C) restriction mapping
(D) marker exchange (E) none of the above

二、填充題：(每題 2%，共 14%)

- The _____ protein terminates transcription for about half of all *E. Coli* mRNAs.
- The assembly of general transcription factors to a eukaryotic promoter begins at the site of _____ in a promoter.
- In prokaryotes, _____ can remove primer, replaces it with correct nucleotides, proofreads new strand, if errors found exonuclease removes and repairs with correct nucleotides.
- The _____ is a protective structure at each end of an eukaryotic chromosome. Specifically, the tandemly repetitive DNA at the end of the chromosome's DNA molecule.
- In prokaryotes, DNA replication begins at a unique site called: _____.
- In the *lac* operon of *E. coli*, _____ is the site which is downstream from the promoter but upstream from the β -galactosidase gene.
- _____ is the term used for the imprecise pairing that occurs between the codon's 3' base and the anticodon's 5' base.

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分子生物學試題

本試題第 2 頁；共 2 頁
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三、問答題：(72%)

1. Please describe the following terms:

- (1) epigenetic modification (3%)
- (2) housekeeping gene (3%)
- (3) Okazaki fragment (3%)
- (4) Shine-Dalgarno sequence (3%)

2. (1) Please describe the differences between reverse transcriptase-PCR (RT-PCR) and standard PCR?(5%)
(2) For what purpose would you use RT-PCR? (5%)

3. Please describe the mechanism of micro RNA in regulation of gene expression ? (10%)

4. Please describe the mechanism of RNA processing in Eukaryote cells.(10%)

5. What is the melting temperature (T_m)? What kind of factors will influence the T_m value? (10%)

6. Eukaryotic genomic DNA containing the *Rb* gene can be cloned into plasmid that replicates in *E. coli*, but the Rb protein is not expressed from this plasmid in *E. coli*. Why? How can the expression of eukaryotic genes in bacteria be completed? (10%)

7. Please describe the steps of Sanger Chain-Termination method of DNA sequencing. (10%)