

系所組別：生物科學與科技學院-生科聯招

考試科目：生物技術

考試日期：0223，節次：1

※ 考生請注意：本試題不可使用計算機。請於答案卷(卡)作答，於本試題紙上作答者，不予計分。

一、Simple Choice Questions 單選題：(50 分，每題 5 分)

1. Which one is not the essential component in PCR
 - a. Taq DNA polymerase
 - b. DMSO
 - c. Mg^{2+}
 - d. dNTP

2. Which of the following enzymes would not be applied in DNA cloning?
 - a. T4 DNA polymerase
 - b. Klenow fragment
 - c. T4 DNA ligase
 - d. Heparinase I

3. Which method is not for DNA separation?
 - a. IEF (Isoelectric focusing)
 - b. CsCl (Caesium Chloride) density-gradient ultracentrifugation
 - c. Agarose gel electrophoresis
 - d. Pulsed Field Gel Electrophoresis

4. Which method could not detect RNA
 - a. Northern blotting
 - b. Southern blotting
 - c. in situ hybridization
 - d. RT-PCR

5. Which statement is not true for SDS-PAGE?
 - a. SDS is required to maintain the pH of loading buffer
 - b. to make a gel with polyacrylamide
 - c. to separate proteins by molecular weight
 - d. to detect the expression level of protein

6. Which factor is not critical to express a recombinant protein in *E. coli*?
 - a. codon usage
 - b. antibiotic selection marker for *E. coli*
 - c. TRP1, a functional gene in amino acid biosynthesis pathway
 - d. promoter choice

(背面仍有題目，請繼續作答)

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7. Which statement is not true for GFP (Green Fluorescent Protein)
 - a. the GFP has a major excitation peak at a wavelength of 587 nm and its emission peak is at 610 nm
 - b. the molecular weight is 26.9 kD
 - c. it was isolated from *Aequorea Victoria*
 - d. GFP is a Ca^{2+} dependent bioluminescent protein

8. Which statement is not true for restriction enzymes?
 - a. an enzyme recognizes and cuts at specific DNA sequences
 - b. all restriction enzymes are active at 37°C
 - c. EDTA, ethanol and high salt should be avoided in the reaction buffer
 - d. DNA methylation can inhibit digestion of certain enzymes

9. CHIP (Chromatin immunoprecipitation) is to detect
 - a. epigenetic regulation
 - b. the molecular weight of histone
 - c. the topology of DNA
 - d. the translation initiation site

10. To estimate the optimal annealing temperature for PCR, which following factor should be considered
 - a. the proofreading activity of Taq
 - b. the GC content of primers
 - c. the concentration of dNTP
 - d. the size of DNA template

二、Short Essay (簡答題 50 分，每題 10 分)

1. Please explain the following methods
 - a. Southern Blotting
 - b. Western Blotting
 - c. Real-time PCR
 - d. SDS-PAGE
 - e. ELISA

2. Compare the advantage and disadvantage of forward genetic vs reverse genetic approaches.

3. If a novel gene is identified, please design experiments to study its function.

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4. Please describe what the DNA microarray is and how it can be applied in biological research.
5. Please explain ips (induced pluripotent stem cells) and its potential application in therapy.