

※ 考生請注意：本試題不可使用計算機

請勿在本試題紙上作答，否則不予計分

Multiple choice questions (24 分，每題 3 分，全對才給分)

1. Which host can express glycosylated proteins?
(A) *Bacillus subtilis*
(B) *Agrobacterium tumefaciens*
(C) *Drosophila melanogaster*
(D) *Caenorhabditis elegans*
(E) *Saccharomyces cerevisiae*
2. Which of the followings are true about a prokaryotic expression vector?
(A) A common promoter of *E. coli* expression system, T7 promoter, is based on the promoter of a bacterial housekeeping gene.
(B) CMV promoter is based on enhancer and promoter of cytomegalovirus immediately-early gene.
(C) T7 promoter-based vectors allow for expression in native *E. coli*.
(D) A vector containing a small fragment of the *LacZ* gene is suitable for blue/white colony screening.
(E) A PCR product with a blunt-end cannot be cloned into TA cloning vector directly.
3. Which material should be included to perform a PCR reaction?
(A) H₂O
(B) Ligase
(C) dNTP
(D) Primers
(E) Template DNA
4. Which technique can demonstrate mRNA expression levels?
(A) Southern blotting
(B) EST sequencing
(C) RT-PCR
(D) Serial analysis of gene expression (SAGE)
(E) 2D electrophoresis
5. If you would like to demonstrate alternative splicing patterns of the specific gene of interest, which of the following method can be used?
(A) Northern blotting
(B) RT-PCR
(C) Fluorescence *in situ* hybridization
(D) Suppression subtractive hybridization
(E) Western blotting
6. Which of the followings are true for a microsatellite marker?
(A) Have been found in the mitochondrial genome, never in the host genome
(B) Potential mRNA markers for cancer screening
(C) Can be used as markers in studies of genetic linkage
(D) Simple sequence tandem repeats
(E) Can be polymorphic

(背面仍有題目，請繼續作答)

系所組別：生物科技研究所甲、乙組

考試科目：生物技術

考試日期：0224，節次：3

7. Which technique can be used to discover partial sequences of unknown, novel genes?

- (A) RNAi
- (B) Whole genome sequencing
- (C) DNA microarray
- (D) Conventional RT-PCR
- (E) Proteomics and LC-MS/MS

8. Which factors are related to sedimentation coefficient of a given particle?

- (A) Molecular weight
- (B) Molecular density
- (C) Molecular composition
- (D) Molecular shape
- (E) Svedberg unit

Define the following terms: (16 分 · 每題 2 分)

1. Chemiluminescence
2. ELISA
3. cDNA
4. Genotype and Phenotype
5. Gram-negative organism
6. MicroRNA
7. induced pluripotent stem (iPS) cells
8. Gain-of-function mutation

Essays (共 60 分 · 每題 6 分)

1. What is Synthetic Biology? Please give an example for describe it.
2. What are essential components of cell-free protein synthesis system?
3. Address the features of NGS (Next Generation Sequencing)?
4. How to construct an EST library? Please describe the procedures
5. What are differences between forward genetics and reverse genetics?
6. Address the principle of selectable markers for studies with auxotrophic yeast strains
7. Address the application and advantages of antimicrobial peptides isolated from eukaryotic animals
8. In your opinion, what will be a competitive playing field of Taiwan biotech industry in the recent future?
9. In your opinion, what are personality traits of successful biotech researchers?
10. Which research topics of NCKU Institute of Biotechnology you are interested?