

壹、單選題 1~30 題(60)，每題 2 分(答案請填至答案表內)。

1. Which of the following statements about choosing an *E. coli* expression system is incorrect? (A).Very low yield. (B).Comparatively inexpensive. (C).Expression systems thoroughly understood. (D).Relatively easy technologies.
2. Which ones are commonly used as a reporter gene in basic researches? (A). β -actin. (B). α -tubulin. (C).Albumin. (D).GFP.
3. Which techniques can be used to detect the locating genes in chromosomes? (A).Northern blot. (B).ELISA. (C).RNAi. (D).FISH (fluorescence in situ hybridization).
4. Which of the following methods does not separate molecules by size? (A).Flow cytometry. (B).Agarose gel electrophoresis. (C).Gel filtration chromatography. (D).SDS-PAGE.
5. Which of the following enzyme cleaves only single-strand nucleotides? (A).Restriction enzyme *Nde* I. (B).S1 nuclease. (C).RNase H. (D).Kinase.
6. DNA polymerase I in *E. coli* has proofreading activity, because it processes (A).5'→3' exonuclease activity. (B).3'→5' exonuclease activity. (C).5'→3' endonuclease activity. (D).3'→5' endonuclease activity.
7. What can the footprinting experiment be used for? (A).Identifying protein-protein interaction. (B).Localizing a protein in a cell. (C).Localizing a m-RNA. (D).Identifying the binding sites of a protein on DNA in vivo.
8. Which method apply polymerase chain reaction? (A).Yeast two-hybrid. (B).Mutagenesis of a gene. (C).Northern blot. (D).ELISA.
9. Which of the following methods can be applied to determine the pI values of proteins in bacterial cell lysate? (A).Western blot. (B).Two-dimensional gel electrophoresis. (C).Immunoprecipitation. (D).Flow cytometry.
10. In terms of molecular weight which order is correct? (A).dsDNA(3 kb) > dsRNA(3 kb) > protein > amino acid. (B).dsRNA(3 kb) > dsDNA(3 kb) > protein > amino acid. (C).protein > dsDNA(3 kb) > dsRNA(3 kb) > amino acid. (D).protein > dsRNA(3 kb) > dsDNA(3 kb) > amino acid.
11. Which description is correct about “blue/white screening” in cloning experiments? (A).It does not involve *LacZ* activity. (B).It usually does not carry an antibiotic resistance gene. (C).The vector with target gene inserted will make the transformants turn white. (D).The color of the transformants depends on the size of the target gene inserted.
12. Method is not used to reveal apoptotic cells. (A).TUNEL assay. (B).RNAi. (C).Annexin V staining assay. (D).DNA fragmentation.
13. Which genetic codon codes for methionine in eukaryotes. (A).AGT. (B).TTT. (C).TAG. (D).ATG.

14. Which description is incorrect about a cloning vector ? (A).It usually carries an antibiotic resistance gene. (B).It usually carries a replication origin. (C).It usually carries a multiple cloning site. (D).pET 20b(+) can accommodate insert up to 50 kb.
15. Which of the following experiment can be used demonstrate the binding of a transcription factor to its target DNA sites in vivo ? (A).Electrophoresis mobility shift assay. (B).Immunoprecipitation. (C).Northern blot. (D).SDS-PAGE.
16. Which of the following statements about PCR is incorrect ? (A).It needs two primers. (B).It needs a single- or double-stranded DNA as template. (C).It needs a thermostable DNA polymerase. (D).RNA is a suitable template for PCR.
17. Which of the following methods is commonly used to determine the concentration of DNA ? (A).Sequencing. (B).Ultracentrifugation. (C).Absorbance at 595 nm. (D).Absorbance at 260 nm.
18. Which of the following can be used to label probes for RNase protection assays ? (A). $\alpha^{32}\text{p}$ -dTTP. (B). $\alpha^{32}\text{p}$ -UTP. (C). $\alpha^{32}\text{p}$ -ATP. (D). $\gamma^{32}\text{p}$ -UTP.
19. Which molecule involves in cell apoptosis ? (A).Caspases. (B).Phospholipases. (C).Phosphatase. (D).RNase.
20. Which of the following methods can be used assay DNA-protein interaction ? (A).Yeast one-hybrid test. (B).Southern blot. (C).EMSA. (D).Yeast two-hybrid test.
21. Which of the following methods is not suitable to investigate protein-protein interaction ? (A).Western blot. (B).Immunoprecipitation. (C).RT-PCR. (D).Yeast two hybrid screening.
22. Which description is incorrect about PCR ? (A).It includes 3 basic step: denaturation, annealing, and extension. (B).The extension temperature are usually between $72\sim 74^{\circ}\text{C}$. (C).The annealing temperature are usually between $92\sim 95^{\circ}\text{C}$. (D).Each cycle doubles the number of DNA molecules.
23. Specific RNA can be degraded by specific short dsRNA in cells. This is called: (A).Northern blotting. (B).RNase protection assay. (C).RNAi. (D).RNA free.
24. Which of the following techniques can be used to determine the levels of mRNA ? (A).Northern blot. (B).Southern blot. (C).Western blot. (D).RNase protection assay.
25. Which of the following method can separate protein by size ? (A).Ion exchange chromatography. (B).Affinity column chromatography. (C).Agarose gel electrophoresis. (D).Isoelectric focusing.
26. Mutation in a gene could generate (A).A polypeptide with amino acid changes. (B).A shorter peptide. (C).A longer peptide. (D).All of the above are possible.
27. p(pico)單位是(A). 10^{-3} . (B). 10^{-6} (C). 10^{-9} .(D) 10^{-12} .

28. 三種相同分子量的 plasmid DNA;(a) open circular form. (b) linear form. (c) closed circular form，在相同濃度的電泳膠上移動速率為(A). $a > b > c$.(B). $b > a > c$. (C). $a > c > b$. (D). $c > b > a$.
29. 某生欲利用 Spectrophotometric 來定量自己所純化的 ds(double strand) DNA 原液，過程如下;某生從原液中取出 18 μl 後，加入 982 μl 的水充分混合成總體積為 1 ml，再以 OD260 來分析最後得到吸光值為 0.72，請問該生原液濃度為： (A).5 $\mu\text{g}/\mu\text{l}$. (B).2 $\mu\text{g}/\mu\text{l}$. (C).500 $\mu\text{g}/\mu\text{l}$. (D).200 $\mu\text{g}/\mu\text{l}$.
30. 0.2 μmole 的 A 物質溶在 10ml 的水中，請問最終濃度為(A).2000 nM. (B).20 nM. (C).20 μM . (D).2 nM.

貳、配合題1~10題(25)，每題2.5分(答案請填至答案表內)。

請將表格內之生物技術相關專有名詞，擇一最適切或最相關者，將其英文字母代號填入下列各子題

A. Star activity	B. Hot start techniques	C. Streptavidin	D. ligase	E. DNA fingerprinting
F. A260/A280 ratio of > 2	G. Alkaline phosphatase	H. Transient transfection	I. Polynucleotide kinase	J. YAC

- Under certain conditions, the enzymes are able to recognize and cleave nucleotide sequences which differ in some positions from the canonical site.
- Analyzes the differences between individuals of the fragments generated by using restriction enzymes to cleave regions that contain short repeated sequences
- RNA contamination.
- Most Taq DNA polymerase have significant activity at much low temperature
- Biotin
- Remove terminal phosphates from either the 5' or 3' end..
- Introduction of episomal expression vector into mammalian tissue culture cells for short term expression experiments.
- Joins two DNA molecules or fragments.
- Adds a phosphate to the 5'-OH end of a polynucleotide to label it or permit ligation.
- Large insert genomic DNA libraries

叁、簡答題1~5(15)，每題3分(答案請填至答案表內)。

某生欲利用鹼性溶解法 (alkaline lysis) 進行質體DNA抽取，實驗過程包含下列步驟；

- (1)加入buffer (5M potassium acetate)。
- (2)加入buffer(20 mM Tris-HCl (pH 8.0), 10 mM EDTA (pH 8.0), 50 mM glucose)。
- (3)加入buffer (0.2 N NaOH, 1 % SDS)。
- (4)收集細菌離心。
- (5)加入95%的酒精。
- (6)加入phenol/chloroform。

1. 請將實驗步驟依先後順序排出(請直接填寫號碼，例如 213564)
2. 以上實驗過程中可以去除、水解 RNA 是幾號步驟(請直接填寫號碼)
3. 以上實驗過程中可以去除、變性蛋白質是幾號步驟(請直接填寫號碼)
4. 以上實驗過程中可以用來沉澱 DNA 是幾號步驟(請直接填寫號碼)
5. 以上實驗過程中可以進行 DNA 復性是幾號步驟(請直接填寫號碼)