

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： 0308 · 節次： 3

※ 考生請注意：本試題 可 不可 使用計算機

一、 Simple Choice Questions 單選題：(50 分，每題 2 分)

1. Which of the following enzymes couldn't utilize in the probe synthesis of southern blotting?
(A) Taq DNA polymerase
(B) Pfu DNA polymerase
(C) T7 RNA polymerase
(D) Klenow fragment
2. Which is not the key factors of the recombinant protein expressed in *E. coli*?
(A) Intron number of the protein gene
(B) Promoter
(C) Gene copy number
(D) Amino sequence of the foreign protein
3. If you have to break a bacterial cell and collect the soluble protein which method is not suitable?
(A) French press
(B) Ultrasonic
(C) Lysozyme
(D) Boiling
4. Which of the flowing methods of protein concentration couldn't remove the salt in the buffer?
(A) Ultrafiltration
(B) Ammonium acetate precipitation
(C) TCA precipitation
(D) Lyophilizer
5. HAT medium is using to select hybridoma in monoclonal antibody production, which of the following is the components of HAT medium?
(A) Heparine
(B) Hypoxanthine
(C) Horseradish
(D) Haematoxylin

(背面仍有題目,請繼續作答)

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6. Sterilization is the common procedure to avoid equipment or material contaminated by microorganism, which of the following method and condition is wrong?
- (A) Steam autoclave, 121°C, 15-30 min
 - (B) Dry heat, 150°C, 10 min
 - (C) 70% Ethanol, spray or immersion
 - (D) Ethylene oxide gas
7. Isoelectric focusing, (IEF) is using for separate proteins by their
- (A) Molecular weight
 - (B) Shape
 - (C) Hydrophilic
 - (D) Isoelectric point (IP)
8. Melting temperature (T_m) is an important condition in hybridization or PCR reaction, which is not the major factors that influence T_m
- (A) Salt concentration
 - (B) Buffer pH
 - (C) Formamide concentration
 - (D) length and sequence of the probe/ primers
9. Green fluorescence protein (GFP) is using for a reporter gene that isolated from jellyfish, GFP will continue expressing green fluorescence in _____.
- (A) Mg^{++}
 - (B) Ca^{++}
 - (C) Mn^{++}
 - (D) Na^+
10. RNA interference (RNAi) is a technology using in down-regulation a particular gene, which of the following molecular couldn't induce RNAi?
- (A) snRNA
 - (B) siRNA
 - (C) miRNA
 - (D) dsRNA

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11. Which of the following virus couldn't use in gene transfer to animal cell?
- (A) Herpesvirus
 - (B) Retrovirus
 - (C) Poxvirus
 - (D) Picornavirus
12. Which of the following method is not using for plant cell culture?
- (A) Epithelium cell culture
 - (B) Hairy root culture
 - (C) Callus culture
 - (D) Protoplast culture
13. Plasmid DNA may appear in three major conformations, which run at different speeds in an agarose gel electrophoresis. Which is the correct in order of electrophoretic mobility from slowest to fastest?
- (A) Linear, supercoiled and open-circular
 - (B) Open-circular, linear and supercoiled
 - (C) Supercoiled, linear and open-circular
 - (D) Linear, open-circular and supercoiled
14. Which of the following method couldn't use in concentrate virus particle?
- (A) Density gradient centrifugation
 - (B) Microfiltration
 - (C) Ion exchange material
 - (D) PEG precipitation
15. Dolly sheep is the first cloned sheep in the world could you explain which the major technology using in Dolly?
- (A) Nuclear Transfer
 - (B) Sleeping beauty transposon
 - (C) ES cell transfer
 - (D) DNA microinjection

(背面仍有題目,請繼續作答)

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16. What is the genome size of *E. coli*?
- (A) 3.0×10^6 kb
 - (B) 1.5×10^7 kb
 - (C) 4.0×10^3 kb
 - (D) 1.3×10^4 kb
17. Which of the following technology was using in the gene expression differential screening?
- (A) Genome DNA library
 - (B) cDNA library
 - (C) Subtractive library
 - (D) Expression library
18. Hexamer histidine tag (His tag) is using in many commercial plasmid of protein expression in prokaryotic organism, His tag will be fused in the recombinant protein and help for _____.
- (A) Protein expression
 - (B) Increase soluble protein production
 - (C) Protein purification
 - (D) Avoid protein degradation
19. Protein A column is using for purify immunoglobulin (Ig) according to the _____.
- (A) Protein size
 - (B) pI
 - (C) Shape
 - (D) Affinity
20. Doubling time is the period of time required for the bacterial replication once, what is the doubling time of *E. coli*?
- (A) Eight hours
 - (B) Sixteen hours
 - (C) One hour
 - (D) Half hour

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21. The components of a reverse transcription reaction are _____.
- (A) DNA, reverse transcriptase (AMV-rt), a pair of primers and dNTP
(B) RNA, reverse transcriptase (AMV-rt), a pair of primers and dNTP
(C) RNA, reverse transcriptase (AMV-rt), one primer and dNTP
(D) DNA, reverse transcriptase (AMV-rt), one primer and dNTP
22. Which component of a plasmid is necessary for their mRNA transcription?
- (A) Ori
(B) Promotor
(C) Ribosome binding site
(D) Multi cloning site
23. Which technology is not using for protein detection?
- (A) PCR-ELISA
(B) ELISA
(C) ELISAspot
(D) Sandwich ELISA
24. You just prepared a small amount of plasmid, and quantitated the amount and quality by using spectrophotometer, which results of the OD_{260nm}/OD_{280nm} ratio represent the plasmid is in good quality?
- (A) 1.0
(B) 1.4
(C) 1.8
(D) 2.2
25. Which of the following stem cell has the best differentiation potential?
- (A) Totipotent stem cells
(B) Hematopoietic stem cells, HSC
(C) Pluripotent stem cells
(D) Adult stem cells, ASC

二、Short Essay 簡答題：(50 分，每題 5 分)

1. Please describe what is single nucleotide polymorphism (SNP)?

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2. What is chimera mouse? Please explain how to produce a chimera mouse?
3. What is DNA shuffling? Please describe it.
4. What is real time PCR? Please describe the principle and application.
5. What is adjuvant? How are they used in the vaccine formula?
6. What is gene gun? Please describe the principle and application.
7. What is gene therapy? Please describe the principle and give an example.
8. Please describe how to produce *E. coli* competent cell?
9. What is cord blood? How the cord blood could be used in the biotechnology?
10. Please describe what is proteomics?